ne 1949

Chemical Industries

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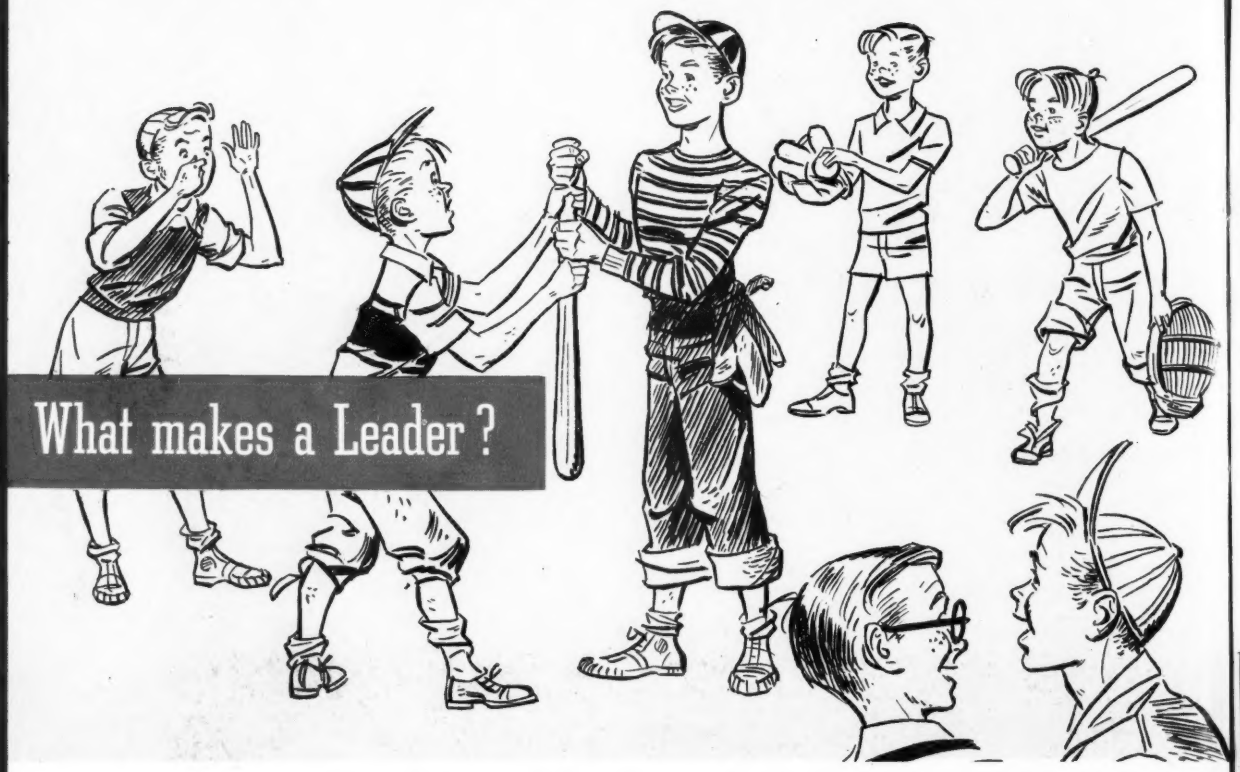
Cover: High-Pressure Ammonia Compressors



What makes a Leader?

Leaders don't just happen. In most cases, it is the combination of skill, performance and facilities that add up to make one "the leader."

The unsurpassed quality and uniformity of Solvay products are backed by:

- the facilities of five strategically located plants
- the long experience and production skill of the men who run these plants
- a progressive research organization working with the finest in laboratory equipment
- Solvay's "Industry-Wise" Technical Service which serves you with an intimate knowledge of your industry, and offers expert advice on the use, handling, and storing of alkalies
- prompt and convenient delivery from more than two hundred local stock points covering the entire country

This combination of services, offered by America's first and largest manufacturer of alkalies and associated chemicals, clearly establishes Solvay as the leading producer in the field.

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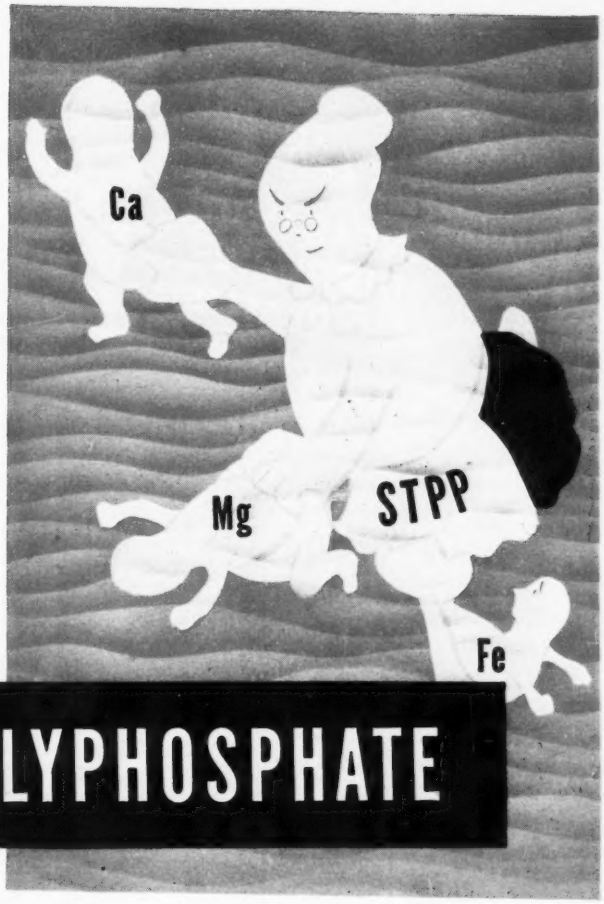

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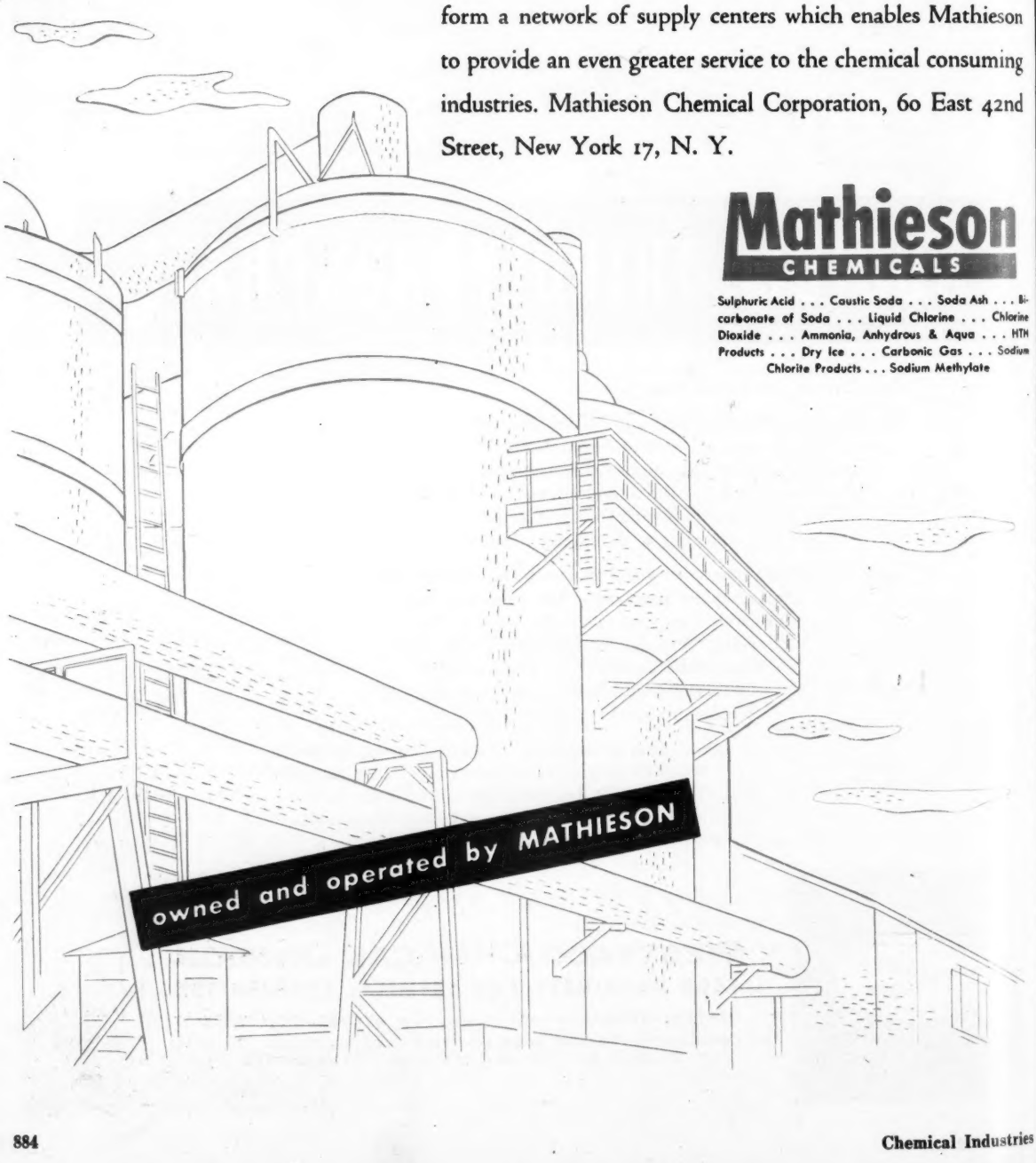

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THE READER WRITES

A Statement On the Food Emulsifier Hearings

To the Editor of Chemical Industries:

Some confusion regarding food emulsifiers has resulted from the highly technical hearings on bread standards currently being conducted by the Federal Food and Drug Administration.

These hearings have included such terms and phrases as "ersatz products" . . . "I. G. Farben" . . . "non-nutritive substitutes for farm-grown food ingredients" . . . "chemical agents possibly injurious to the nation's health" . . .

In the interest of public understanding of this important subject, I would like to make the following statements:

In 1941, FDA started hearings to determine the types of ingredients which might be included in a standard bread loaf and other yeast-raised baked goods. As a result of these hearings, FDA drafted a standard for bread, but, due to war-time conditions, this standard was not adopted. The postwar FDA bread standard hearings were started in November, 1948, and since that time some 7,000 additional pages of testimony have been given. The sessions are expected to continue for several more months.

The Atlas Powder Co. is participating in the current hearings. Our products are among the emulsifiers being considered for inclusion in the FDA standard. Atlas did not participate in the 1941 sessions because our food emulsifiers were not then available for bread use.

Atlas produces three general types of food emulsifiers, trade-marked as "Span," "Tween" and "Myrj" (pronounced "merge"). The "Span" and "Tween" emulsifiers are used primarily in mixes for ice cream and cakes. "Myrj," most widely used of these Atlas products, has its main outlet in bread-making.

In no sense could Atlas emulsifiers be termed "ersatz." During the war Germany used synthetic materials, produced from coal or petroleum to augment supplies of fats and oils. By contrast, Atlas food emulsifiers are all based upon farm-produced fats and oils or corn products.

All Atlas emulsifiers were developed in Atlas's own laboratories, with our own technical know-how.

Atlas has never worked, directly or indirectly, with I. G. Farben on any research developments of any type.

After Atlas had applied for U. S. patents on the food emulsifiers we developed, we learned that I. G. Farben possessed some American patents in the same general field. To protect ourselves against possible suits for patent infringement, we sought early in 1941 to secure a non-exclusive license being offered by Farben's patent company in New York. These were available to anybody.

After some months of negotiation, this patent license, with no restrictions as to marketing, was obtained from the General Aniline and Film Corp., which was at that time indirectly an American subsidiary of I. G. Farben.

In 1942, control of General Aniline and Film was seized by the U. S. Government Alien Property Custodian, which still controls that Corporation. In 1945 and 1948, Atlas obtained two additional licensing agreements from GAF, which simply broaden the scope of the 1941 license.

And, by the way, these licensing agreements are in no way related to "Myrj," our product which is under primary consideration at the FDA hearings.

Atlas food emulsifiers are produced chemically, but, as I explained previously, they are made from natural products from U. S. farm lands. Atlas chemists originally combined corn sugar with hydrogen to produce sorbitol and mannitol on a commercial scale. Sorbitol was then treated with fatty acids, derived from natural fats and oils, to make "Span." We then combined a "Span" with polyoxyethylene to produce "Tween." "Myrj," in turn, results from a combination of fatty acids and this chemical.

Atlas researchers have developed the newest emulsifiers which have found high acceptance in the food field. However, there are other emulsifiers on the market, chiefly produced synthetically by large shortening manufacturers whose patent control on use of these emulsifiers has given them a virtual monopoly.

The baking industry's growing preference for Atlas emulsifiers has posed the first real threat to the dominance of these other emulsifiers. In my opinion, this explains the current campaign to cast doubt upon Atlas emulsifiers at the FDA hearings.

I think the question involved is simply whether there is to be competition and scientific progress—for the benefit of the American people—or stand-pattism and monopoly.

I think it is noteworthy that in five months of hearings before the FDA, no evidence has ever been presented that Atlas emulsifiers are injurious to health.

Isaac Fogg, President
Atlas Powder Co.
Wilmington, Del.

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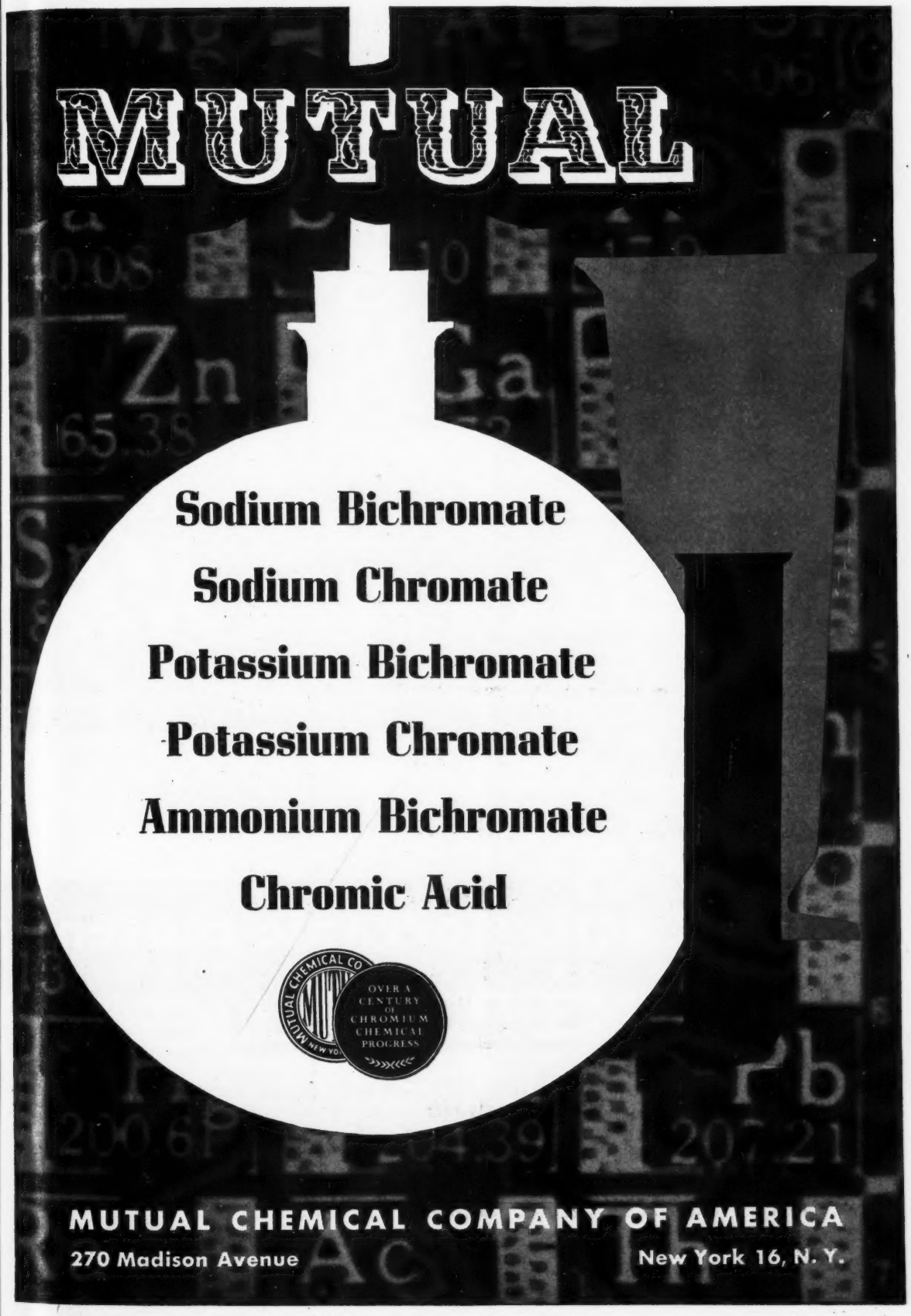
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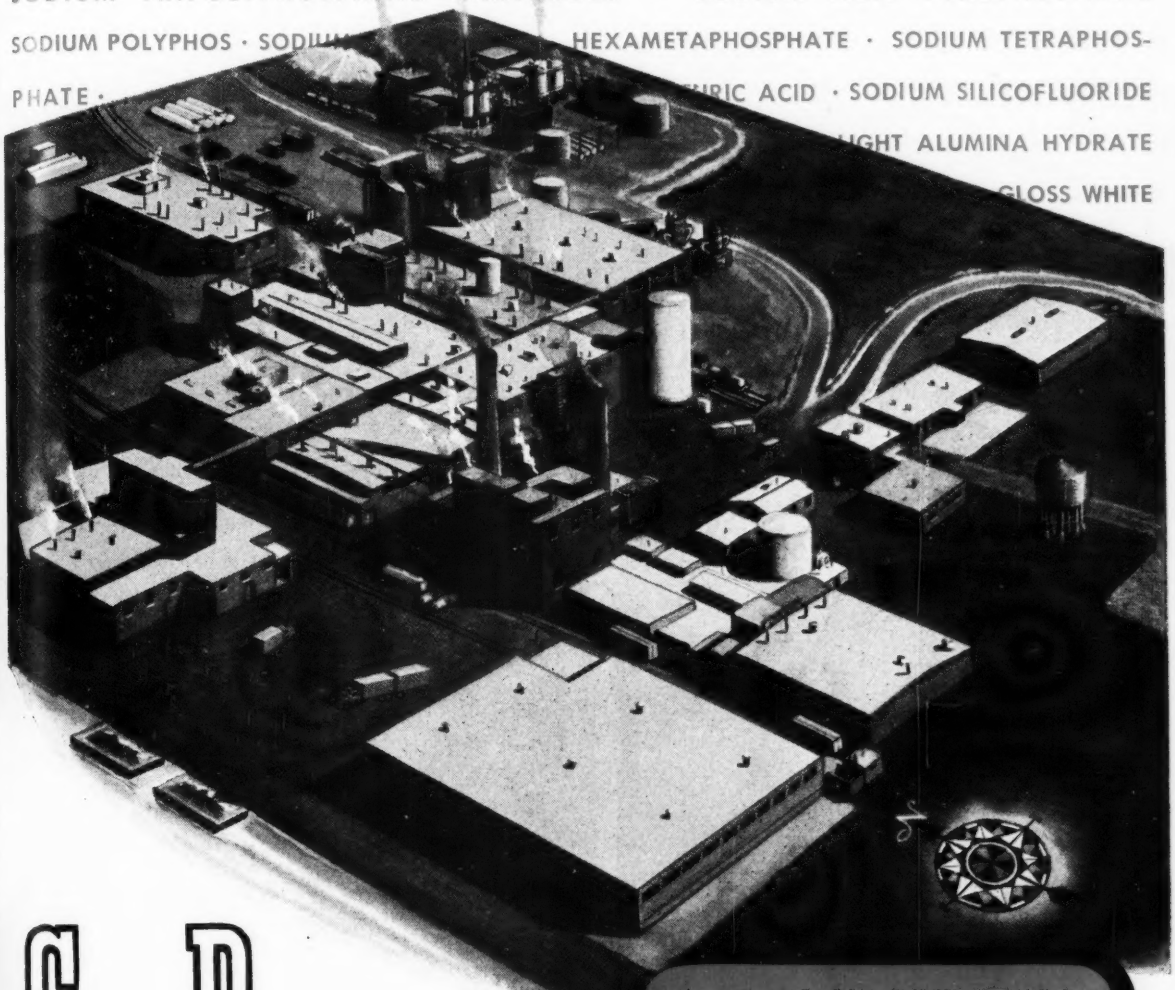

Sodium Phosphates for Industry

From the Blockson plant (pictured above) shipments of Sodium Phosphates are made daily—bound for all principal production centers of the nation.

They go directly to supply manufacturers and processors in scores of industries and to replenish stocks of strategically located Blockson distributors.

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write for this NEW 36 page book

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Physical Properties
Materials of Construction
Types of Construction
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Storage
Sampling and Analysis
Alkylation of Isoparaffins and Olefins
HF as a Condensing Agent
HF as a Fluorinating Agent

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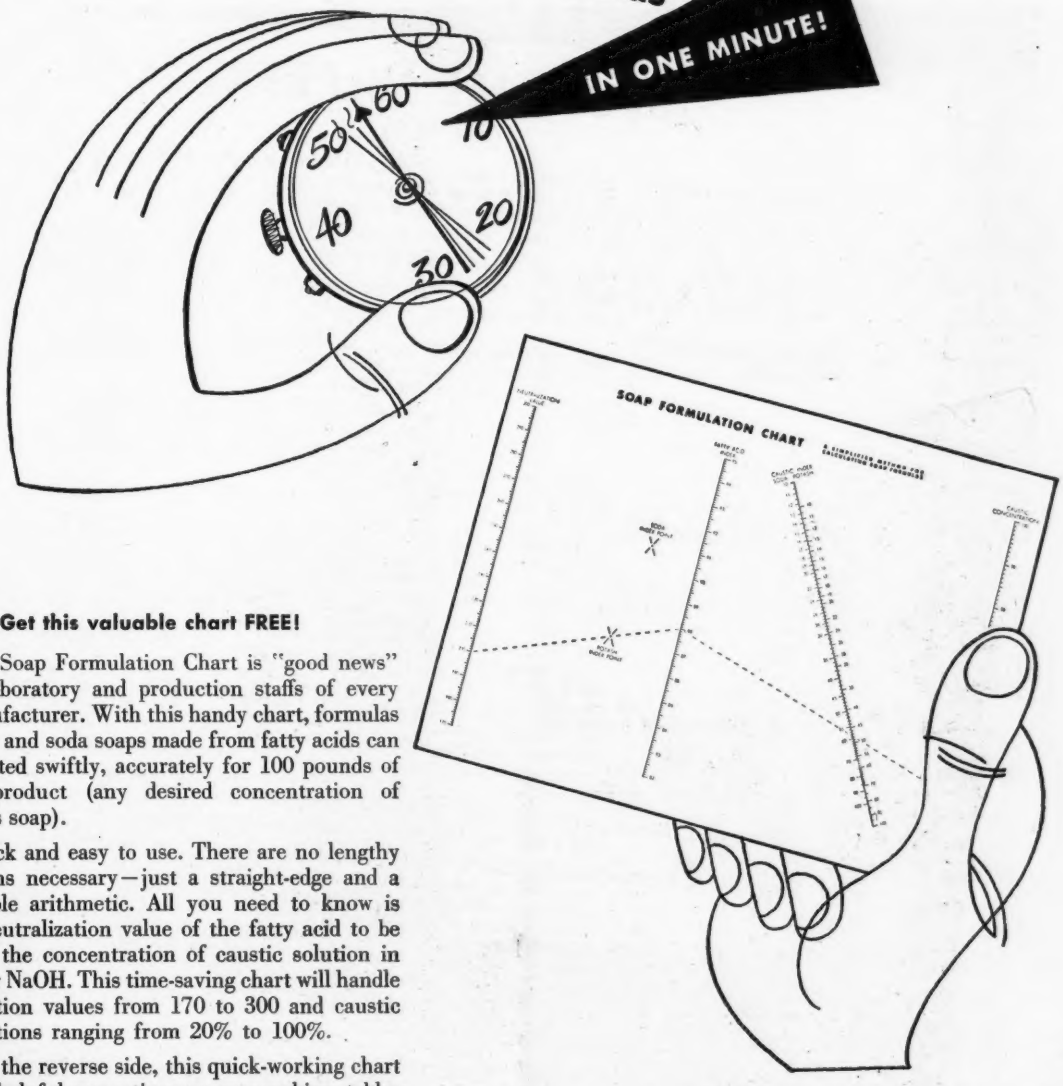

Get this valuable chart FREE!

This new Soap Formulation Chart is "good news" for the laboratory and production staffs of every soap manufacturer. With this handy chart, formulas for potash and soda soaps made from fatty acids can be calculated swiftly, accurately for 100 pounds of finished product (any desired concentration of anhydrous soap).

It's quick and easy to use. There are no lengthy calculations necessary—just a straight-edge and a little simple arithmetic. All you need to know is (1) the neutralization value of the fatty acid to be used; (2) the concentration of caustic solution in % KOH or NaOH. This time-saving chart will handle neutralization values from 170 to 300 and caustic concentrations ranging from 20% to 100%.

And on the reverse side, this quick-working chart gives you helpful suggestions on soap-making, tables for converting °Baume to % KOH or NaOH, and neutralization values for the Armour fatty acids widely used in soap-making.

But remember that although formulation and manufacturing procedure are vital factors in determining the quality of your finished soap, that soap can be no better than the fatty acids from which it is made! That's why it pays to buy the best—and you can't buy better fatty acids than Armour's Neo-Fats. Data sheets, samples, and price quotations are available upon request.

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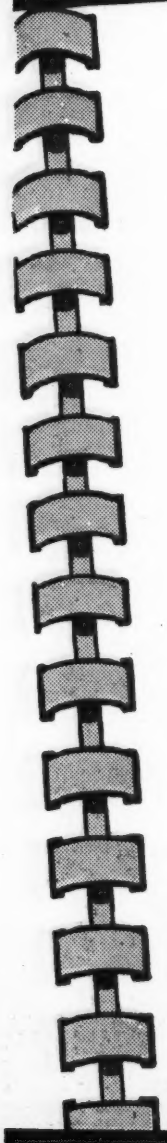
A page from the Stauffer Catalog

NUMBER SEVEN IN A SERIES



INDUSTRIAL SULPHURS
(REFINED)

Refined Sulphurs . . These are elemental sulphurs of superior purity produced by distilling crude sulphur. The purity of these sulphurs is not less than 99.8%. They are generally free burning. The grades available include the following:

Virgin Rock . . . . . Refined sulphur cast solid in wooden barrels.

Golden Rock . . . . . (*Broken Rock*) —Refined lump sulphur composed of lumps and coarse granular pieces.

Arrow Brand Roll Brimstone . . . . . Refined sulphur cast in molds to form truncated cones weighing approximately three pounds each; or, in cylindrical sticks of approximately 1¾" diameter and broken lengths.

USES: Virgin Rock, Golden Rock and Arrow Roll are preferred for those applications that require clean, pure sulphur, and which are to be melted or burned. Examples are—fumigation, sugar and starch refining, bleaching wool and straw, "sulphuring" hops and grouting machinery foundations.

Anchor Brand Flowers of Sulphur, U.S.P. . . (Sublimed Sulphur, Sulphur Sublimatum)—Refined sulphur in fluffy powder form. Contains up to thirty percent of the allotropic form which is insoluble in carbon disulphide, and differs in this respect from other refined sulphurs which are completely soluble in carbon disulphides.

USES: Medicinal and pharmaceutical preparations, stock feeds, chemicals, fumigation and bleaching, cutting oils and extreme pressure lubricants, and as a filter-aid.

Yellotone Refined . . SALT BLOCK SULPHUR: This is a refined sulphur specially prepared for the preparation of sulphurized salt blocks for stock feeding. The high color imparting property of this pure sulphur, and the good physical condition for mixing with the salt, are the qualities of interest.

Diamond "S" Brand . REFINED HEAVY FLOUR SULPHUR: Ground refined sulphur having a fineness of not less than 90% passing No. 80 U.S.S. sieve.

Tiger Brand Refined LIGHT FLOUR SULPHUR: Like DIAMOND "S", but ground finer to meet the requirement of approximately 100% passing No. 100 U.S.S. sieve and approximately 85% passing the No. 200 sieve.

USES: Where a pure, powdered sulphur, soluble in CS_2, or other suitable solvents, is required, TIGER BRAND Sulphur is of U.S.P. XII quality, and may be employed in place of ANCHOR Flowers of Sulphur if desired. Raw material in the manufacture of matches and pyrotechnics, bonding abrasives in grinding wheels; pharmaceuticals, stock remedies and foods; and sulphur cements and caulking compounds.

"Acid Free" . . . . Ground refined sulphur of special high purity and low to "Nil" acidity. Fineness 100% through No. 100 sieve and 85 to 90% passing No. 200 sieve.

Second page of Stauffer Industrial Sulphurs will appear in this space next month.

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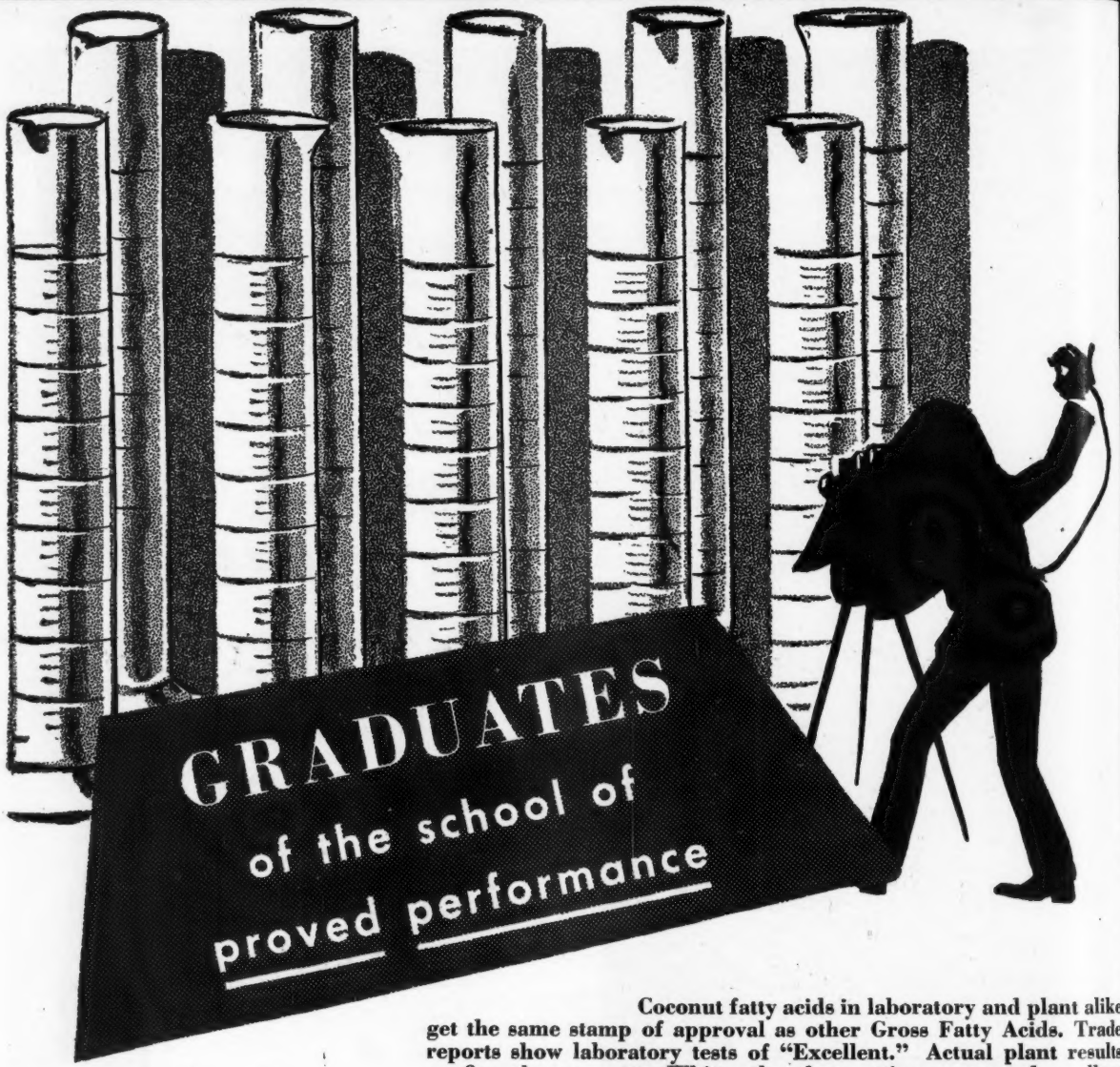

Coconut fatty acids in laboratory and plant alike get the same stamp of approval as other Gross Fatty Acids. Trade reports show laboratory tests of "Excellent." Actual plant results confirm these reports. White color, fast wetting power and excellent detergency of finished products assure customer acceptance in the textile field.

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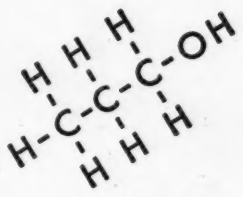

lower cost...greater volume

Celanese production of n-propyl alcohol is now meeting large-scale demands. This straight chain alcohol—applicable to processes where its characteristic excellent solvent action and miscibility can be used to advantage—is available for shipment in drum or tank car amounts.

PHYSICAL PROPERTIES

MOLECULAR WEIGHT		60.09
COLOR		water white
ODOR		characteristic alcohol-like odor
SPECIFIC GRAVITY	20°/4° C	0.8044
DISTILLATION RANGE	ASTM °C	2° including true boiling point
WEIGHT PER GALLON	20° C	6.7 lbs.
SOLUBILITY		soluble in water and practically all organic solvents
FLASH POINT	open cup	85° F
BOILING POINT	1 atm.	97.2° C
FREEZING POINT		—127° C
VAPOR PRESSURE	100° F	0.9 lbs. per sq. in. absolute
RELATIVE EVAPORATION RATE		1.3 (butyl acetate=1)

If you are looking for an improvement in your products, or short cuts in processing, the straight chain advantages of n-propyl alcohol are worth investigation. n-Propyl alcohol allows the solvent user greater solvent formulation freedom and can be used as a replacement and extender for higher alcohols. Call or write for additional information and specifications and a copy of the newly published Celanese Chemical Brochure.

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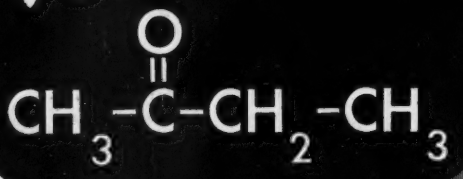

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FOR CLEANING AND DYEING—MEK is useful in paint and varnish removers and metal surface cleansers . . . is a valuable solvent for dyes and their intermediates.

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FOR CHEMICAL SYNTHESIS—MEK lends itself to diverse types of syntheses through reactions of both the carbonyl group and the adjacent hydrogen atoms . . . has high potentiality as an intermediate for the manufacture of resins.

PROPERTIES

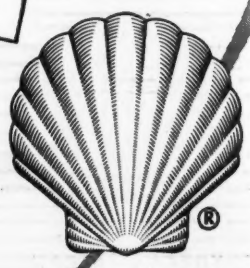
Molecular Weight	72.10
Specific Gravity 20°/4°C	0.8047
Boiling Point (760 mm.)	79.6°C
Freezing Point	−86.4°C
Vapor Pressure at 20°C	71.2 mm. Hg
Refractive Index, n_D^{20}	1.3788
Solubility at 20°C—in water	27.0% wt.
water in	12.5% wt.

LACQUER SOLVENT PROPERTIES

Dilution Ratio	
Toluene	4.6**
*Aromatic Petroleum Naphtha	3.2**
Aliphatic Petroleum Naphtha	1.1**
Viscosity (8% RS 1/2 second Nitrocellulose solution at 25°C)	10 centipoises
Blush resistance (% relative humidity at 80°F)	45%
Rate of evaporation (normal butyl acetate=1.0)	4.6

*Containing approximately 70% aromatics.
**For a mixture of 75% methyl ethyl ketone and 25%v low-boiling alcohol.

A sample of Methyl Ethyl Ketone will be forwarded promptly following your letterhead request.



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EMULSION BREAKING	✓					
LIGHT-DUTY HOUSEHOLD DETERGENTS			✓	✓		
PENETRANT	✓	✓				
INDUSTRIAL DETERGENTS					✓	✓
HEAVY-DUTY HOUSEHOLD DETERGENTS			✓			✓
EMULSIFIER					✓	✓
WETTING AGENT	✓	✓				
CHARGE STOCK FOR SPRAY AND DRUM DRYING			✓			
DRY MIXING WITH ALKALIS				✓	✓	✓
LIQUID HOUSEHOLD DETERGENTS		✓				
COUPLING AND SOLUBILIZING	✓					

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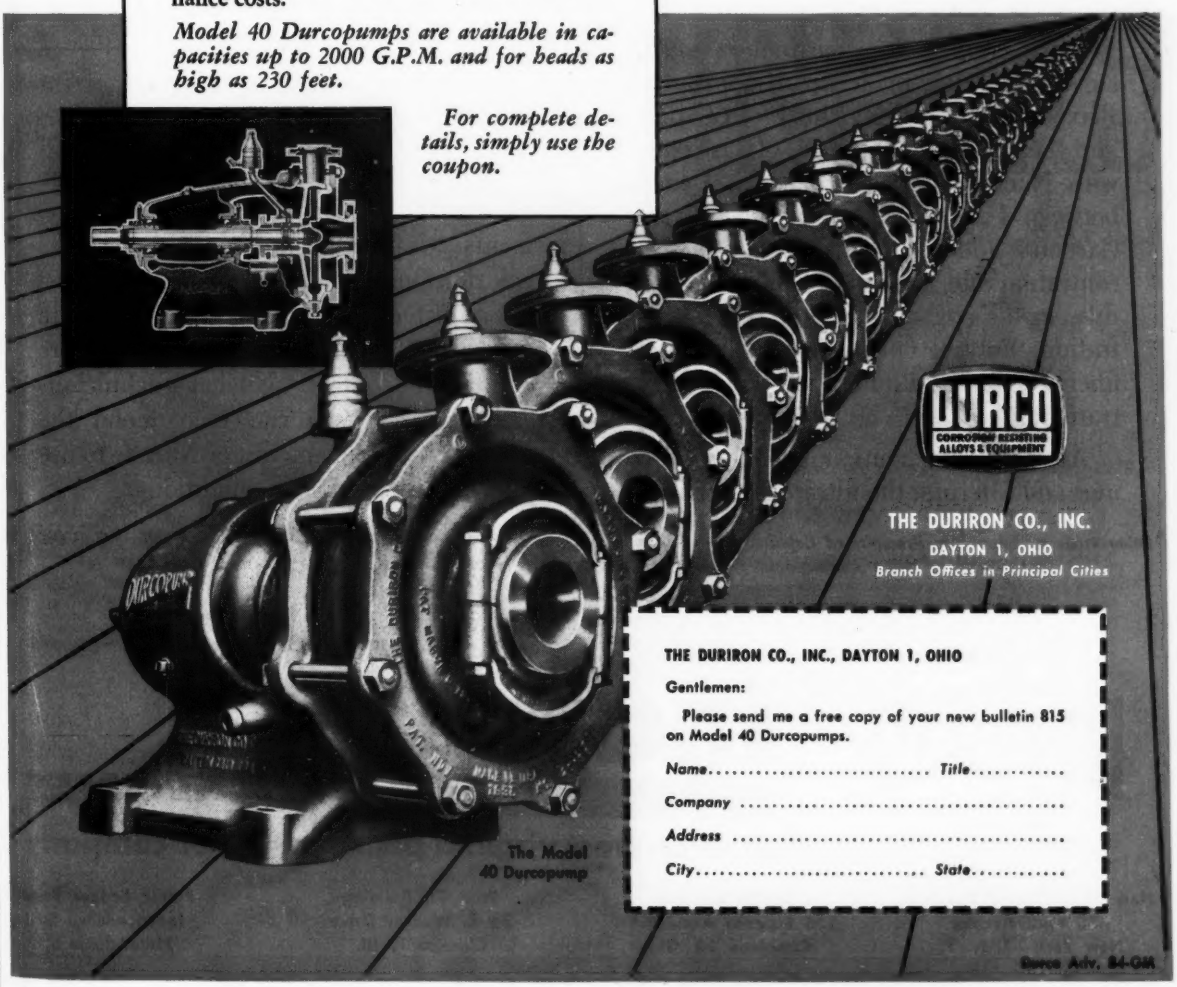

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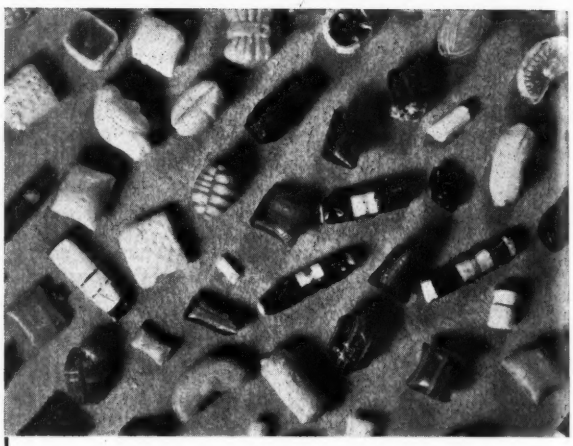

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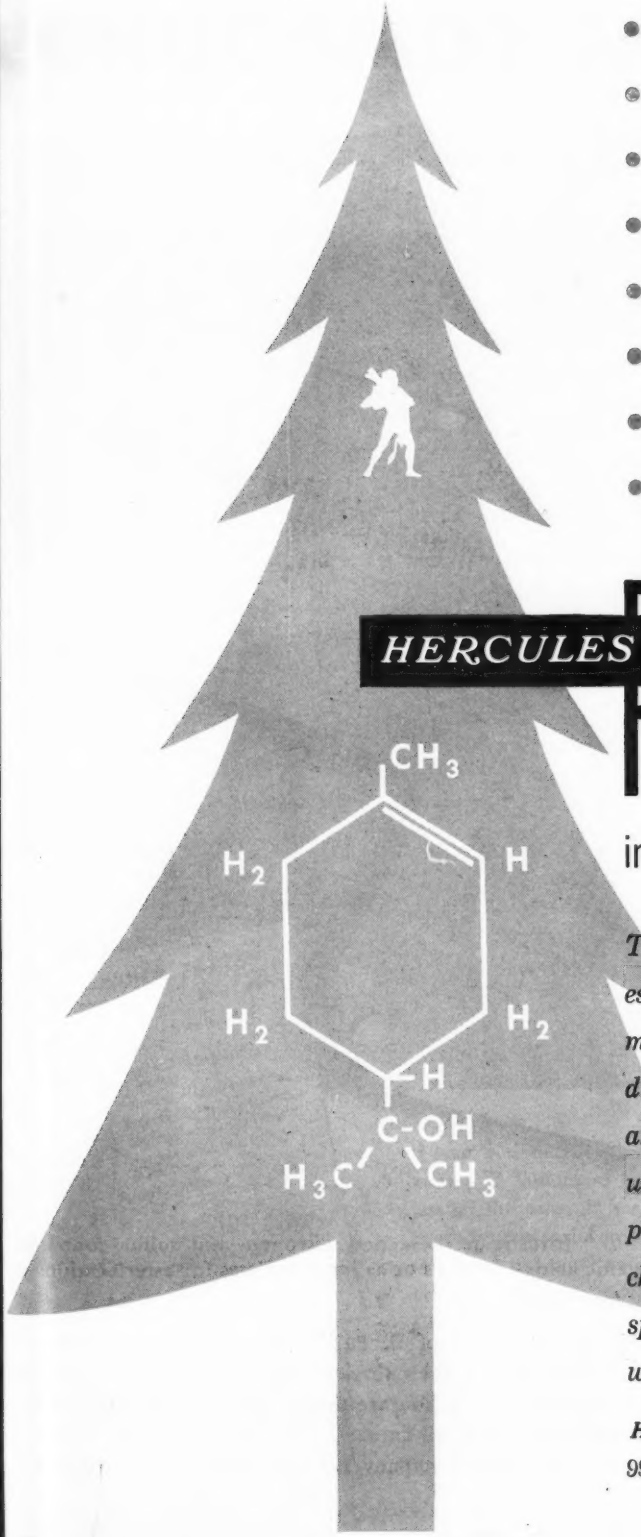

- *penetrate*
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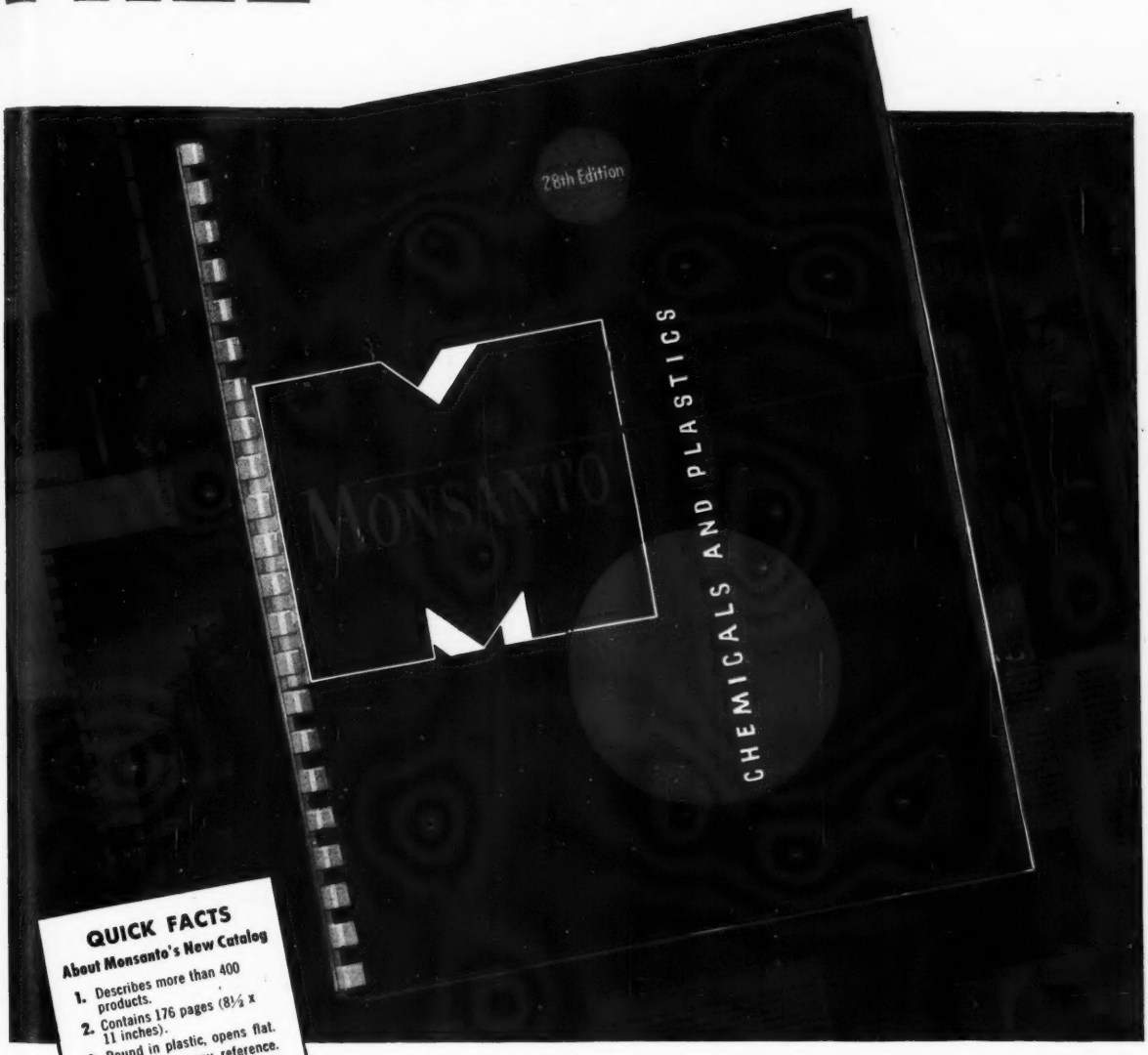

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Brittle Temperature	−25°C.
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FLEXOL Plasticizer DOP for all non electrical uses—maximum A.P.H.A. colo of 100.

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Chemical Industries

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

Newsletter,
June, 1949

For Your Information:

Add another firm to the list of those actively interested in acetylene production by thermal cracking of hydrocarbons (CI Newsletter, February 1949): Carbide and Carbon Chemicals Corp. is pushing work at Texas City, Texas, on large-scale cracking of hydrocarbons to acetylene.

As an aftermath of the Holland Tunnel explosion, tougher penalties are in the cards for violators of rules regulating trucking of chemicals through tunnels and over bridges. A bill pending in the New Jersey Legislature, which would increase the penalty for such violations to as much as a $500 fine and 50-day jail sentence, indicates the temper of the authorities. There is also talk of making such violations felonies instead of misdemeanors, as they are at present.

* * CI * *

Cities Service Oil Co. has filed suit against Celanese Corp. in the U. S. District Court, Wilmington, Del., charging infringement of its hydrocarbon oxidation patents.

A permit to market has been filed and a license to manufacture has been granted on Compound 42, a new rodenticide discovered by Dr. Karl P. Link and associates at the University of Wisconsin. The compound, a condensation product of benzalacetone and 4-hydroxycoumarin, is extremely toxic to rats and mice, relatively nontoxic to higher animals. Several Government agencies--viz., Fish and Wild Life Service, U. S. Public Health Service, and Department of Agriculture--are studying use of the compound.

* * CI * *

Koppers Co. is again dehydrating ethanol to ethylene for styrene production at Kobuta; but it is very likely that use of ethanol for this purpose will be short-lived. You can look for a price increase of ethanol to 28¢ a gallon, as CI predicted last February (p. 213).

Mathieson Chemical Corp. has named the Chemical Plants Division of Blaw-Knox Construction Corp. the sole licensing agent

for its horizontal stationary mercury cell (CI, Aug. 1947, p. 212) to produce high-concentration caustic (50 per cent directly from the cell), chlorine, and hydrogen.

* * CI * *

Production of 600-BTU-per-cu.-ft. gas at a cost of 36¢ per million BTU's (compared with about 80¢ for carburetted water gas) is claimed by Hydrocarbon Research, Inc., New York, for a new coal gasification process now being pilot-planted. Coal as a fluidized solid is first carbonized at relatively low temperature: 1,000 degrees F. It is then gasified with oxygen and steam at 2,000 degrees.

Several large chemical concerns, including Du Pont and Montrose, are interested in the U. S. Department of Agriculture's recently announced synthesis of esters closely resembling the insecticidal components of pyrethrum (CI, May 1949, p. 745). Although patents are pending, the process will be free to the public. Detailed information is being given to interested visitors at the USDA Experiment Station at Beltsville, Md. One insecticide maker believes that pyrethrum or the related synthetic material may replace as much as 50 per cent of the DDT now in use.

* * CI * *

Note on the diminution of high-grade iron ores: Consolidated Mining & Smelting Co. (Canada) is studying the possibility of large-scale pig iron production from 25 years' accumulation of lead-zinc tailings at its Kimberly, B.C., mines.

Two patents (U. S. Nos. 2,471,928 and 2,471,994) assigned to Rohm & Haas Co. describe the preparation of methacrylonitrile from isobutylene. In the first, the addition product of isobutylene and nitrosyl chloride is decomposed by treatment with an amine, yielding the product. In the second, pyridine reacts with the addition product to give a pyridinium chloride which is separated and decomposed by heat.

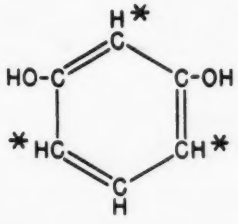
* * CI * *

Here and There:

Westvaco Chemical Division of Food Machinery and Chemical Corp. is expanding its chlorine-caustic capacity at Charleston, W. Va.... A new antibiotic, borrelidin, has been isolated by research workers at Hoffman-La Roche, Inc., from a streptomyces species. It is specific for relapsing fever and enhances the activity of penicillin against several organisms...An improved color signal for detergents has been developed by Economics Laboratories. Incorporated in its polyphosphate household cleaning product, Soilax, to form a pink powder, it turns the water green when the proper amount of detergent has been added, yellow if too much is used...Cities Service Oil Co. will construct a 23 million gallons-per-year oil and grease compounding plant in the Chicago area.

The Editors

KOPPERS
RESORCINOL



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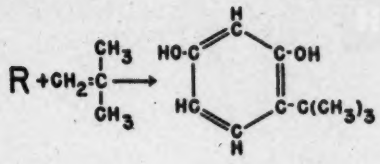

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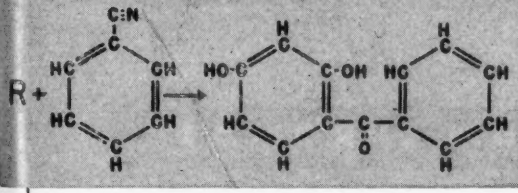

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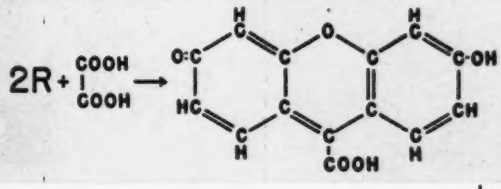

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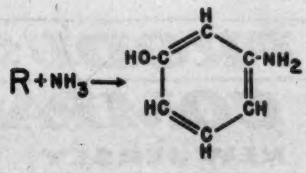

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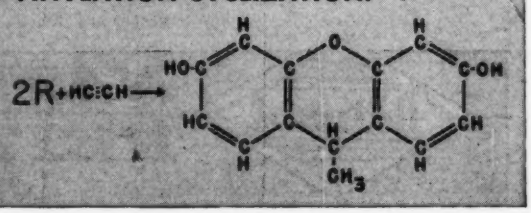

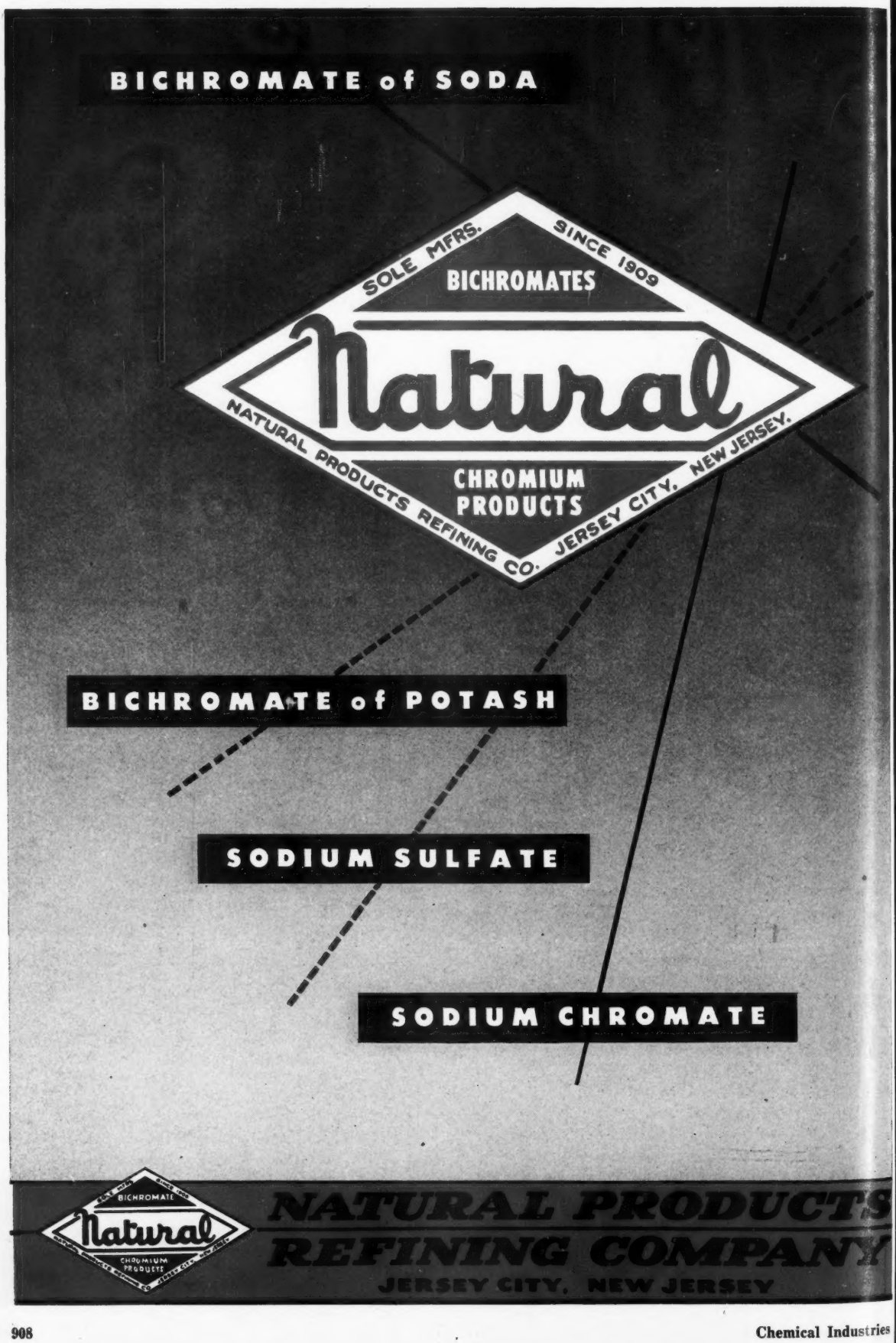
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THE RESPONSIBILITIES OF SHIPPERS

by ***ROBERT L. TAYLOR, Editor***

THE EXPLOSION AND BURNING last month of a truckload of carbon disulfide in the Holland Tunnel, which runs under the Hudson River between New York and New Jersey, raises some questions of legal responsibility, the answers to which will be of importance to chemical makers.

Thus far it has been established that the truck, which was owned and operated by a private trucking concern, was carrying 4,400 gals. of carbon disulfide in 55-gal. drums. The maximum cargo of CS_2 permitted through the tunnel under Port of New York Authority regulations is 100 gals. The driver maintains that he had been given no bill of lading, had no knowledge of the nature or the hazard of the cargo, and had been given no special instructions as to what route to take.

Investigations to fix responsibility for the explosion are now under way. What their outcome will be remains to be seen, but regardless of specific findings there is almost certain to be stricter enforcement—in New York, at least, and very possibly other localities—of regulations pertaining to shipment of hazardous materials. There is already pressure for more severe treatment of violators. The Port of New York Authority has requested that the New York and New Jersey legislatures make violation of tunnel and bridge regulations a felony instead of a misdemeanor.

But irrespective of any formal developments that may come out of the tunnel explosion, the incident emphasizes again the importance of the responsibilities of the shipper of dangerous materials.

Principally these responsibilities have to do with packaging and labeling. If a hazardous chemical is properly packed, properly labeled, and the label prominently displayed and big enough to be read easily, the shipper has fulfilled the major part of his obligation.

There is, however, some difference of opinion as to what constitutes proper display of a warning. There are those who feel that warnings, like escape clauses in contracts, should be as inconspicuous as the law allows, that there is no point in scaring people, especially customers.

This attitude disregards entirely the purpose of a warning, which is to prevent accidents rather than absolve one from guilt in court. If a material is highly flammable or explosive or poisonous it is far better to make sure that persons handling or using it know this so they will take at least ordinary precautions. If the customer is such that this kind of information is apt to be alarming to him, then the antidote must be more education rather than less warning.

In the case of many materials, the Interstate Commerce Commission specifies the exact precautionary label to be used. Where it does not, the manufacturer or shipper should see that precautionary information stands out on whatever label is used by resorting to larger letters or different-colored ink. In most cases it is desirable to carry labels on both the top and side of the container.

In addition to proper labeling, shippers of hazardous materials should provide carriers with a bill of lading that gives the nature of the shipment and any special precautions to be observed. If a driver knows what he is carrying he is better equipped to act intelligently in an emergency.

While these points may not always be covered by statutes or regulations, they are things for which shippers of hazardous materials must assume at least a moral responsibility. A conscientious carrying out of this responsibility can be one of the industry's best weapons against the fear and mistrust of "chemicals" that is still held by a large share of the public.

Research Pay-Off

WITH RESEARCH BUDGETS now coming under closer scrutiny than at any time since before the war, a recent report by Merck & Co. provides a striking example of how research can pay off in very tangible terms.

Last year 63% of Merck's net sales were accounted for by sulfonamides, vitamins and anti-biotics, all new commercially within the previous twelve years.

Vitamins, first sold in the late 'thirties, reached their peak in dollar volume in 1943 and continued as the company's most important product group until 1946. That year introduction of streptomycin, combined with a new peak for penicillin, lifted anti-biotics to the top position, a spot they have held ever since.

Similar compilations for some other companies not in the pharmaceutical field would make interesting reading and provide further evidence of what well-directed research can do.

A high purity *coagulant* especially manufactured for compounders of latex products...

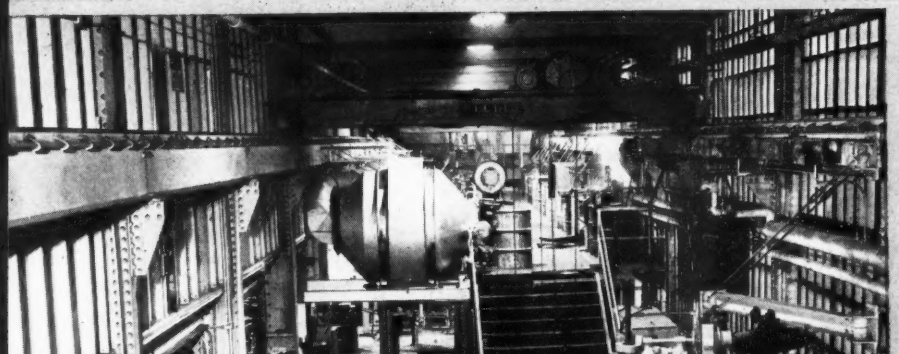


Photo Courtesy American Anode, Inc., Akron, Ohio

Baker's CALCIUM NITRATE

The dependable uniformity and high quality of Baker's Calcium Nitrate gives it an ever-widening appeal to the rubber industry.

Especially manufactured for use by latex compounders, Baker's Calcium Nitrate has the exceptionally high purity demanded in a coagulant. It has superior wetting qualities . . . does not harden in the barrels, and remains in workable condition . . . gives more uniform results, with less trouble in process work.

This product is a technical crystal ranging in size from 1½" to smaller sizes. It is a creamy white color. It contains 3 molecules of water of crystallization.

Baker's Calcium Nitrate helps reduce overall production costs—gives more efficient and economical results! Specify it for your processing.

Baker supplies several other chemicals to the rubber industry—chemicals known for their uniformity and dependability. Whatever your needs, your inquiries for samples and prices are invited. Write to J. T. Baker Chemical Co. *Executive Offices:* Phillipsburg, New Jersey.

6 Baker Chemicals for the Rubber Industry

- CALCIUM NITRATE
- MAGNESIUM OXIDE
- MAGNESIUM CARBONATE
- LEAD ACETATE
- LEAD PEROXIDE
- CARBON DISULFIDE

Baker's Chemicals

C. P. ANALYZED • FINE • INDUSTRIAL

What's new

HYPERSORPTION COMES OF AGE

A new fractionation technique—separation by a moving bed of activated carbon—commands the attention of the process engineer.

TWO years' successful operation by one commercial Hypersorber and a year's satisfactory results from a second unit have moved into line, as another piece of artillery for the design engineer, a new adsorption fractionation technique. Still a third plant, to carry out a third type of fractionation is now under construction by the Foster-Wheeler Corp., which has built all commercial plants.

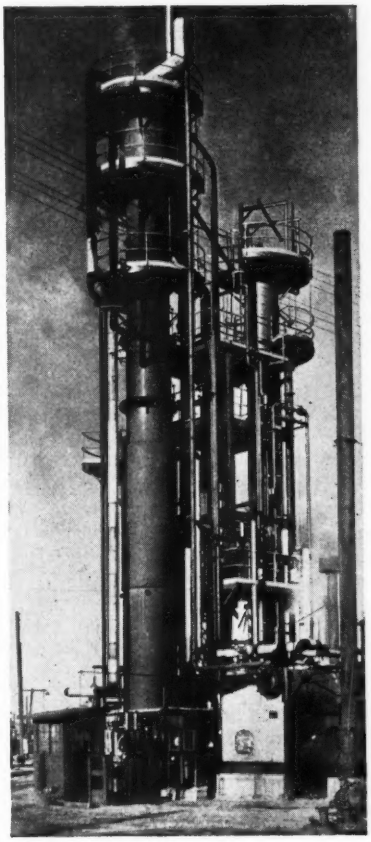
When completed, this new Hypersorber, to be utilized by the Standard Oil Co. of Cal. for the separation of propane and propylene from a refinery gas stream *(CI, April 1949, p. 552)*, will be the largest commercial unit. It is a single tower of the double feed inlet design; in operation it will be the equivalent of two towers operating in parallel. C_3 hydrocarbons are recovered as a side cut and C_4 hydrocarbons are removed as a bottom cut. C_1 and C_2 gases pass overhead.

As yet, Hypersorption's commercial applications have been confined to hydrocarbon fractionation. But it can be used for such diverse separations as recovery of both hydrogen and ethylene from coke oven gases, separation of hydrogen chloride from methane, recovery of hydrogen from either methane-hydrogen or carbon monoxide-hydrogen mixtures, and the separation of acetylene from cracked natural gas.

How It Works

In the Hypersorption process, developed under the direction of Clyde Berg of the Union Oil Co. of Cal. (*CI, Oct. 1947, p. 625*), a moving bed of activated carbon is employed to separate one vapor from another by continuous selective adsorption and stripping.

In operation a feed gas stream, e.g., a hydrocarbon mixture, passes counter-current to a moving bed of adsorbent carbon. The adsorption capacity of the carbon is preferentially satisfied by the higher-molecular-weight constituents; thus, when the inlet gas reaches the carbon the high-molecular-weight materials displace those of lower molecular weight that have already been adsorbed in the upper portion of the tower. Proper location of side stream takeoffs permits recovery of several fractions from a single tower.



DOW'S ETHYLENE: Once it was wasted.

A steaming (heating) section located at the bottom of the tower frees the carbon of adsorbed material, which is drawn off directly above or passes on up the tower as reflux. However, a portion of the heaviest material remains on the surface of the carbon. Clean carbon surfaces are provided by continuously withdrawing a fraction of the circulating carbon and passing it to a high-temperature direct-steaming section to remove most of this material, usually by operating at about 1,000° F. Small quantities of polymerized material or extremely high-boiling material can be removed by stepping up the temperature to 1,300° F., which is in the water gas range. The activity of the carbon does not seem to be impaired by such operation.

Ethylene First

The first Hypersorber, built for Dow Chemical Co., at Midland, Mich., was added to its liquefaction fractionation unit to recover ethylene from the demethanizer overhead, which would otherwise be lost. The 4½' tower operates at 70 psi and recovers 98.5% of the ethylene charged. Initial operations were on a charge gas containing only 5% ethylene; but the plant is now charging an even larger volume of gas containing 7% ethylene with no increase of ethylene concentration in the gas discharged.

When this unit was installed there was some concern about loss of carbon due to attrition. However, this loss (using black walnut carbon) was only about 90 pounds per day. All attrition seems to occur as the carbon passes through the lift lines. Little, if any, seems to take place as it passes through the tower.

In hydrocarbon fractionation, Hypersorption can only fractionate the inlet gas into C_1, C_2, C_3, and C_4 fractions. Thus, a stream fraction containing both ethane and ethylene must be liquefied and the ethylene recovered by distillation.

Methane Next

Very pure methane was desired by the Rohm and Haas Co. at Houston, Texas, for the synthesis of hydrogen cyanide from methane and ammonia. Completed in 1948, the 4' tower can process 1½ million cubic feet of natural gas per day at 70 psi and produces an offgas containing 99.1% methane, the remainder being inerts and containing no other detectable hydrocarbon material.

Carbon losses at Houston have averaged about 33 pounds per day using the same carbon circulation rates employed by Dow. This unit, however, uses a medium-grade coconut shell carbon. Foster-Wheeler states that more recent developments in lift-line design and proper tailoring of the carbon will reduce attrition loss another 75%.

Recycling Next

Hypersorption's next progress step will probably take it into the recyling field.

Here the Hypersorber must operate at much higher pressures than those used by present plants. Designs for this purpose, and which will operate at 1,500 psi, are already on the drawing boards. C_3 and C_4 recoveries of 97% or more can be obtained from a natural gas containing only 1% LPG (liquefied petroleum gas) —a performance unmatchable by any other means. Such recoveries will greatly increase the nation's reserve supply of LPG not only by increasing the quantity recovered in existing recovery units, but also by permitting the economical exploitation of natural gases heretofore considered too "dry" for processing.

Hypersorption's proponents are quick to point out that in practically all cases, existing methods of treatment possess an economic advantage for the fractionation of gases containing more than about 25% LPG. Its major field of usefulness will be for the treatment of the relatively "dry" gases.

Acetylene Recovery

Production of acetylene by cracking hydrocarbon gases is a project upon which few, if any, chemical companies have not made major expenditures. Use of Hypersorption separation for recovery of acetylene from offgas may be the tonic needed to revitalize some of these research programs, many of which have been in hibernation for many years. It has been stated that acetylene can be produced from a gas containing upwards of 3.5% by volume for a final cost of not more than 8¢ per pound. This latter figure is based on a plant producing 20 million pounds a year from the cracking of a dry natural gas costing 10¢ per M cubic feet. At this price the plant will pay out within four years and provide a reasonable return on the investment.

Coke Oven Gas

Hypersorption is expected to aid in producing ethylene not only in the United States but also overseas for the recovery of ethylene from coke oven gas. Units can be operated on gases containing hydrogen cyanide, hydrogen sulfide, and higher sulfur compounds that usually interfere in present recovery operations. Hydrogen cyanide polymerizes at the surface of the carbon on which the higher sulfur compounds are also adsorbed. Carbon activity is maintained by operating the high-temperature steaming section under gasification conditions—i.e., at 1,300° F. The adsorber can also be operated to give pure hydrogen as the overhead stream, thus providing both pure ethylene and pure hydrogen for chemical syntheses. A sulfur-free overhead fuel gas (hydrogen and methane) can be produced if it is so desired.

In certain syntheses a mixture of hydrogen chloride and methane is recovered; and separation and recovery of hydrogen chloride by water absorption involves the use of much expensive corrosion-resistant material. Use of Hypersorption, operating with a dry high-temperature steaming section, where material blinding the carbon surface is removed under the influence of heat alone, effectually avoids this problem. Hydrogen chloride is preferentially adsorbed, while the methane is removed overhead.

Other Fractionations

Hypersorption has been considered for the recovery of hydrogen sulfide from natural gas. Here its economic application is limited to gas streams which are low in C_2 and C_3 and high in hydrogen sulfide. It can be utilized for the removal of sulfur compounds and carbon dioxide from synthesis gas (carbon monoxide and hydrogen) for the Fischer-Tropsch synthesis. It is a low-cost method for the separation of argon from air. Synthetic ammonia recycle gas can be cleaned up to provide the correct nitrogen-hydrogen ratio. It can also be employed to remove nitrogen from natural gas as before it enters the pipeline. These represent only a beginning, and more new applications are being found each day.

Inasmuch as Hypersorption is a totally new fractionation technique, its use must be considered wherever the materials being separated or purified are vapors. Thus, its potential applications are as myriad as those to which distillation or any other similar separation technique have been applied.

FINES FOR STEEL

DEVELOPMENT work on methods of agglomerating iron ore fines has been stimulated by the increase in ore of this character expected to result from the steel industry's growing dependence on lower-grade ore deposits.

Employing a variation of the Disco smokeless fuel process, Pittsburgh Consolidation Coal Co., in collaboration with National Steel Corp. and The M. A. Hanna Co., is making exploratory tests of a new method of utilizing extremely fine sizes of iron ore in blast furnace operations.

The new development involves a two-step test procedure. First, fine sizes of iron ore and metallurgical coal are mixed and passed through the special process, which agglomerates the mixture into ball-shaped lumps for use in the blast furnace burden.

The second step involves the experimental use of the agglomerate in a blast furnace.

BOOSTER FOR WOOD

Addition of Cu to chromated zinc chloride increases toxicity and permanency as a wood preservative.

A NEW wood preservative, copperized chromated zinc chloride (CCZC), will soon be enlisted in the never-ending war against decay. The formulation, 73% zinc chloride, 20% sodium dichromate, and 7% cupric chloride, is a joint development of the Grasselli Chemicals Division of E. I. du Pont de Nemours & Co., who will manufacture and market the preservative, and the Koppers Co., who will be the first to put it to use.

CCZC will cost about 30% more than the present-day chromated zinc chloride, CZC, on a poundage basis. But smaller quantities are required and it is expected that the cost of the treated wood will be comparable.

Ten Years' Work

Copper was first added to the standard chromated zinc chloride wood preservative in the late thirties, and development has been continuous since that date. The new product shows greater resistance to leaching than chromated zinc chloride. Corrosiveness, however, seems to be about the same, according to indications from the first two years of a ten-year corrosion test. CZC is less corrosive than straight zinc chloride. In fourteen years, CZC-treated timbers have given no difficulties with corrosion.

Stake Tests

Stake tests on CCZC are not yet completed, but they have progressed far enough to demonstrate the superiority of

TEST STAKES: Another C increased their life.

the new preservative. Indications thus far are that protection can be obtained with only about a third as much CCZC as chromated zinc chloride. Based on 85.5 months exposure, it is estimated that the new material will give at least twice the service life of CZC-treated materials and at the same time maintain comparable flame resistance.

EASY PICKINGS

Ammonium thiocyanate and sodium cyanamide join calcium cyanamide as cotton defoliants.

MECHANICAL cotton pickers don't have the discriminating fingers of the field hand in separating the boll from the leaves. However, chemically defoliating the plant before harvest leaves only the boll to be plucked. For the last eight years calcium cyanamide has done this job well, but it has one limitation: the leaves must be wet for effective defoliation. Moreover, since the commercial defoliant contains certain insoluble materials, it is impractical to use it as a spray.

Into this breach have come two fledglings in this field—ammonium thiocyanate and sodium cyanamide—both of which can be used in dry areas. These promise to make cotton defoliation possible in all localities at all times of day.

Pioneer in the West

Koppers Co., which pioneered in the recovery of ammonium thiocyanate from coke-oven gas, successfully launched the material as a commercial defoliant in the Far West last year when 25,000 acres of cotton, primarily in California, were treated. Sales will again be confined to this area, this year, and the company expects to double last year's figures. Agricultural researchers in the cotton states will receive sufficient amounts for experimental purposes, and by 1950, Koppers hopes to make the material available on a nation-wide scale.

American Cyanamid Co.'s sodium cyanamide will make its commercial debut in California and Arizona in limited amounts this year. The new defoliant, much more hygroscopic than its older stable-mate (which was dusted on over a million acres of cotton last year), should prove a good complement to it as it will be sold where calcium cyanamide does not do an efficient job.

Better Than Nature

Adoption of chemical defoliation has been accelerated by cotton mechanization. Pickers and strippers tear any green leaves present and smear the juice over the fiber, reducing the value of the product. Before calcium cyanamide came along growers used to wait for a frost to kill the leaves, but nature's formulas vary. If the frost is too severe, the leaves remain attached to the plants to yield a trashy cotton when the picker does its work. Chemical defoliants at regulated dosage cause the leaves to drop, and also permit scheduling of picking so that mechanical harvesters can be used constantly. The mad scramble for pickers following a frost is eliminated from the growers' many problems.

COTTON DEFOLIANTS: Give chemicals their dew.

After defoliation, the cotton is easier to find, and better collections in fewer pickings per field result. Defoliated crops give as high a yield as those not treated, and the quality is higher because of more uniform ripening and shorter length of exposure of early-opening bolls to the weather. Better ventilation and early harvesting prevent heavy losses from boll rot, and the defoliation reduces carryover of boll weevils, Army worms, and other pests. Cost of defoliation is but a fraction of the savings of $35-50 an acre resulting from improved grade of cotton and better picking conditions.

Dust and Dew

Calcium cyanamide applied as a dust from an aeroplane or with ground equipment is an excellent defoliant, but the leaves must have dew on them at the time of application or soon thereafter. This water partially hydrolyzes the cyanamide which so affects the leaf cells that the plant sheds its leaves by natural growth processes. However, if a heavy rain soon follows the application, the material is washed off and poor defoliation may result. Because of these restrictions, it is usually applied in the early morning when the leaves are wet with dew or in late afternoon when dew is predicted. In such areas as the arid sections of California, Arizona; New Mexico, the high plains of Texas, and Oklahoma, dews are infrequent and defoliation with calcium cyanamide is not so successful as in more humid atmospheres.

Ammonium thiocyanate, which Koppers is offering as an answer to the moisture limitations of calcium cyanamide, was first produced on a large scale in this country by Koppers in 1941. This was the same year the company established its agricultural research program that has led to the use of the material as a defoliant. Koppers interested the Chipman Chemical Co. in large-scale evaluation of the chemical in California, and the field tests of 1946 and 1947 were so successful that the material was offered commercially last year. Chipman has been and will continue this year to be sales agent.

Application of 7-15 pounds of ammonium thiocyanate per acre as a spray gives excellent defoliation within 10-15 days. Five pounds is not enough to injure the leaves, and 20 pounds causes them to "freeze" (remain on the plant though severely damaged). Absence or presence of dew has no effect, and applications can be made whenever flying weather is good. Rain within three hours after application does not affect defoliation. An added dividend is easier picking of weedy cotton, for ammonium thiocyanate destroys certain cotton weeds. In general, the material has been applied as a spray from a plane; ground rigs to spray cotton at low gallonage per acre without injuring the crop are scarce, although a few are available.

Spraying removes the uncertainty of sufficient moisture for proper defoliation, but the water in the solution must be transported to the field or carried in the plane. In the West, the cost of spraying ammonium thiocyanate has run $4-5 an acre. In the South, lower application fees are principally responsible for bringing the cost down to $3-4 an acre.

Calcium cyanamide, a low-cost chemical produced on a large scale, brings defoliating costs to less than $2 an acre in the South where about 30 pounds an acre is the recommended dosage, and not over $3 an acre in California, where 40 pounds an acre is used.

Although experiments have been made using sodium cyanamide as a spray, American Cyanamid will offer it for use only as a dust. One of the reasons for this decision is that where cotton plants are large and foliage is heavy, dust can be blown down into the plants to contact the lower leaves better than can a spray. Even though it needs some water to be effective, its hygroscopicity is so much greater than calcium cyanamide that it will work in a relative humidity as low as 50. Much of the cotton area of the West has some dew, as witnessed by the 4,000 tons of calcium cyanamide sold in Arizona and California last year. With an extra chemical to handle the really dry sections, American Cyanamid should beat that figure for cotton defoliant sales this year.

SOAP CHIPS: Animal and vegetable kingdoms not toppled.

FISCHER-TROPSCH FATS

UN group surveys synthetic fats, encourages their manufacture in Germany.

HITLER regarded synthetic fats as a triumph of German science. For that reason, much of the literature on the subject is pro-Nazi propaganda. Nevertheless, there is a solid enough foundation of fact behind the smoke-screen of chauvinism to merit thoughtful study by those who worry about the world's food needs.

Hence the Food and Agriculture Organization (FAO) of the UN started nosing into the subject almost three years ago, and last month it published its appraisal of synthetic fats and their potential contribution to world food requirements. Dismissing microbiological synthesis of fats (*CI Newsletter, Sept. 1948*) as being more remote from a practical point of view, the FAO confined its attention to the oxidation of cheap hydrocarbons.

Up-and-Down History

Oxidation of paraffin hydrocarbons to fatty acids was carried out experimentally as long ago as 1865, and the first patents in the field were issued in 1894.

High fat prices during World War I stimulated intensive research on the problem, especially in Great Britain (by Unilever) and Germany. Air oxidation at high temperatures was hit upon by Unilever as the cheapest and most efficient method. Considerable work was done in this country by Jasco, a subsidiary of Standard Oil Co. (N. J.) and I. G. Farbenindustrie.

Low fat prices after the war discouraged further development until 1935, when the Fischer-Tropsch process, developed in Germany to make synthetic liquid fuels, made available a suitable by-product hydrocarbon, "gatsch," for which uses had to be found. A soft, waxy paraffin of suitable molecular weight, gatsch was ideal for fatty-acid manufacture.

Since it comprises from 5 to 12 per cent of the Fischer-Tropsch product, it was available in large quantities; and a German combine, Deutsche Fettsaeure Werke, started production as early as 1937.

Not a Cinch

Synthesis of fats from gatsch—a six-step process—is not easy. The gatsch is oxidized with air at 110° C., atmospheric pressure, with a small quantity of potassium permanganate as a catalyst. Conversion is stopped at 30 per cent to suppress undesirable by-products.

Addition of soda ash and caustic forms soap, which is then separated from the unreacted hydrocarbons by settling, autoclaving, and flash distillation. The crude fatty acid yield is 79 per cent.

The soap is then acidified with sulfuric acid, and the resulting acids are fractionated. The C_{10-18} cut (55 per cent) is esterified with fermentation or synthetic glycerin to give synthetic fat. "Margarine" is made by emulsifying the fat with 20 per cent water and adding salt, diacetyl, and carotene for flavor and color.

Practically all of the steps—purification of the raw hydrocarbon, oxidation, separation of the products—must be controlled within narrow, critical limits of time, temperature, and other factors.

Does It Pay?

Two questions were of particular concern to the FAO: Does it pay? and, Is it edible?

The Germans were able to answer the first question affirmatively by a species of trick bookkeeping: By considering the gatsch a free raw material, they were able to claim that synthetic fat cost the same as the natural product. Actually, if gatsch had been given a fair value, the synthetic fat would have been twice as costly.

Is It Edible?

Natural fats are essentially triglycerides of straight-chain fatty acids with an even number of carbon atoms. Synthetic fats (if properly purified) look the same, smell the same, taste the same, and have generally similar physical characteristics.

But chemically they're a horse of a different color. Up to 50 per cent of the fatty acids contain an odd number of carbon atoms, and many of the chains are branched. Also present are such nonconformist interlopers as hydroxycarboxylic, ketocarboxylic, and dicarboxylic acids, lactones, aliphatic alcohols, and ketones.

What will these molecules do to human metabolism? Nobody seems to know for sure, but indications are that odd-numbered and branched acids are not as effi-

ciently utilized, and extensive chain-branching gives rise to toxic substances. Dicarboxylic acids are apparently not metabolized, but on the other hand they seem to do no harm. They, as well as the hydroxy- and keto-acids and lactones can be removed, however, by proper purification procedures.

The former chief of the Reich Health Office wrote a book contending that synthetic fats were perfectly suitable for human nutrition. He cited 20,000 long-range animal experiments, a test of several years' duration on 300 families, and more accurate experiments on smaller numbers of human subjects. He had an ax to grind, however, and not enough detail is presented to make a strong case.

There seems to be no clear consensus at the present time either for or against the use of synthetic fats as human food.

FAO's Conclusion: Not Yet

More information on all phases of the problem is necessary, concludes the FAO, before large-scale fat synthesis should be advocated.

It cites the facts, however, that world fat production has declined 20 per cent since 1938, and that in five European countries 27 per cent of all fats are used for nonfood purposes. Use of the man-made products for soaps, detergents, greases, and other industrial uses would release a like amount of natural fats for food.

"Since Germany is short of fats," says FAO, "it would be advantageous to encourage the manufacture of synthetic fats in that country for industrial purposes." German capacity at present is 11,700 tons a year—but that represents only an 8-weeks' supply for the Western zones. Moreover, the occupying nations have forbidden, as a war industry, operation of the Fischer-Tropsch process. As far as the rest of the world is concerned, at least, synthetic fats are still a long journey away. Improved technology may speed the journey, but it will probably take a major economic upset to bring us to the destination.

SYNTHETIC SEA LEGS

Dramamine, new drug for motion sickness, now available on physician's prescription.

SEA VOYAGERS with stomachs that can't stand the pitch and roll of a ship can now look forward to spending more time at the bar and less at the rail. This happy prospect has been made possible by a new drug that controls seasickness and other forms of motion sickness.

Generally hailed as a sensational cure for this old malady when Drs. Leslie N. Gay and Paul E. Carliner delivered a report on it at the Johns Hopkins Medical Society at Baltimore last February, Dramamine (G. D. Searle & Co. brand name for β-dimethylaminoethyl benzohydryl ether 8-chlorotheophyllinate, which the Chicago company manufactures under its patents) can now be obtained on a physician's prescription. A number of airlines and steamship lines—among them, United Air Lines, American Airlines, and the Grace Steamship Lines—acting through their medical directors, ship surgeons, airline hostesses and nurses, are making it available to passengers, and many a businessman setting out on a plane trip or sportsman off for a weekend of deep-sea fishing is asking his doctor for this key to a pleasant ride. In another six months or so, the prescription requirement probably will be lifted, and the Army and Navy, many branches of which are using it, are likely to place it on their official supply tables.

Baltimore Trolleys

Dramamine is one of a group of synthetic antispasmodics developed by John Cusick and his associates in the Searle research laboratories. During investigations of its possible use in control of hay fever and urticaria (hives) by the Allergy Clinic at Johns Hopkins, it was administered to a pregnant woman with urticaria who happened to be a lifelong sufferer from car sickness. She noticed that it prevented attacks of the latter, and checks by the investigators revealed that while a placebo repeatedly failed, Dramamine did the trick.

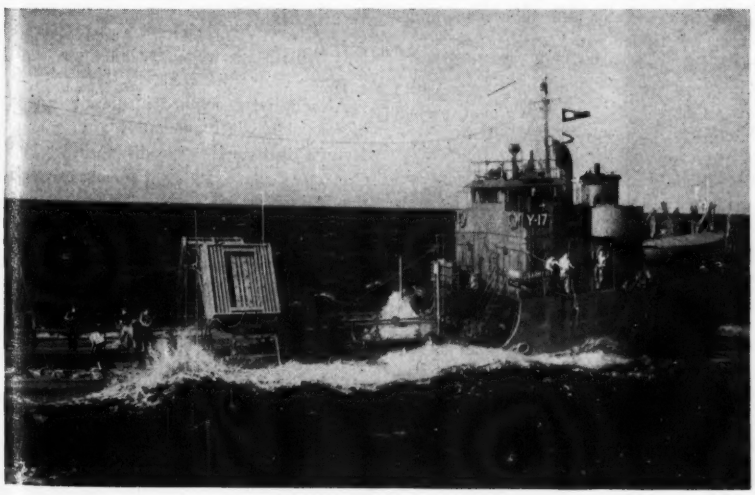
As a result of this discovery, others susceptible to various forms of motion sickness were sought among patients, friends, and acquaintances of the hospital workers. Without exception, none experienced his previous discomfort if given the drug before exposure to motion.

Operation Seasickness

The following summer of 1948 Dramamine was used extensively on the *U. S. S. America*, and the data collected warranted a more complete study of its effectiveness. Since motion sickness was a serious military problem in the last war when many men were transported by air and sea and had to be landed ready for battle, military authorities were anxious to co-operate in efforts to find something better than the drugs they had. These could not be used liberally and repeatedly, and they often produced effects as handicapping as the sickness they controlled.

"Operation Seasickness," as the study of Gay and Carliner has been called, was carried out on a group of replacement troops being transported on the U. S. A. T. *General C. C. Ballou* from New York to Bremerhaven. Five hundred men were divided into four groups and assigned adjacent sub-level compartments where all were subjected to the same living conditions and the same motion of the sea. Group I received 400 mg. of Dramamine as a daily prophylactic dose in equal amounts before each meal and upon retiring. Group II was given placebos identical to Dramamine in appearance and on the same dosage schedule. Group III received Dramamine on this dosage schedule only after seasickness developed, and Group IV, placebos after seasickness developed.

Of Group I (134 men), no man became sick although two reported dizziness. When the drug was discontinued after a time, 41 became ill, but on resumption of treatment, 98 per cent were cured in half an hour, while the remainder received



DRAMAMINE: The sea is drugged.

partial relief. In Group II (123 men), of the 28 per cent that became seasick, all obtained relief within an hour after Dramamine therapy except one who complained of dizziness, although his other symptoms disappeared.

Within 12 hours after the ship set sail, 15 of Group III (129 men) became ill, but within a half hour after Dramamine was administered, 14 got complete, and one, partial relief. Thirty-three of Group IV (99 men) reported seasick within the same period, and 19 secured relief from the placebo, but 14 showed no improvement. All completely recovered within a half hour after Dramamine was given.

Among the 881 men aboard ship who were not part of the controlled study, the unusually rough weather made 195 sick. Dramamine gave complete relief to 96 per cent.

Airsickness

Although this study indicates that Dramamine will prevent or cure most cases of seasickness, it appears to be less effective for airsickness. In a study conducted by Benjamin A. Strickland, Jr. and George L. Hahn at the USAF School of Aviation Medicine, Randolph Field, Texas, 216 subjects were tested in a series of 12 flights simulating conditions experienced in gentle to moderately turbulent air. About 29 per cent of those receiving Dramamine became sick as contrasted with 57 per cent of those receiving a placebo. While not here as spectacular as in Operation Seasickness, Dramamine definitely appears to decrease the incidence of airsickness, and more testing under actual conditions is planned.

Morning Sickness

There is also the possibility of its use in controlling the "morning sickness" of pregnant women. One doctor has reported "encouraging and sometimes dramatic" results. If further work establishes Dramamine as the remedy for this complaint, the most important market for the drug may lie in this application. The number of pregnant women who experience such discomfort probably is greater than the number of landlubbers taking an occasional sea voyage.

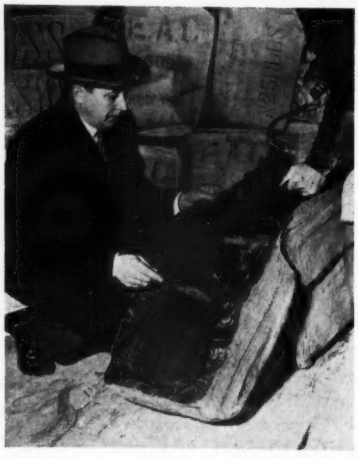
Among the men treated on the *General Ballou*, no side reactions were observed, but since Dramamine is of the antihistaminic class of drugs, an occasional patient may exhibit some such reaction as drowsiness during medication. It is nontoxic, and can be administered rectally as effectively as orally if the patient cannot retain the drug by the usual route. Although 100 mg. is the normal dose, many people taking half that amount—one-half tablet—can weather a rough crossing as well as any old salt.

ROUND-TRIP TICKET

Rubber chemical is sent to plantation, is added to latex before exporting.

IT SEEMS a little extravagant to send a rubber chemical half-way around the world and back again. That's what is happening to Pepton 22, a catalytic plasticizer developed last year by American Cyanamid Co.

Actually, it makes a great deal of sense, for the expense of buying Pepton 22 a round-trip ticket is far outweighed by the elimination of a processing step



PEPTONIZED RUBBER: First batch arrives.

when the smoked rubber sheets arrive here.

Easier There

At the plantation the chemical can be added directly to the liquid latex, whereas here it would have to be milled into a tough, rubbery mass. Also, at the plantation it can be added to large batches at a time. Here the rubber manufacturer, working with smaller quantities, would use such a small amount of plasticizer per batch that extremely accurate and time-consuming measurements would be involved.

Easier Here

Rubber containing the desired amount of plasticizer (0.125 to 0.25 per cent) as prepared at the plantation is like ordinary rubber in appearance and hardness. It can be transported and stored without softening.

But the domestic user has an easier time when he starts to process it: Because the Pepton catalyzes plasticization, only half as much mastication is necessary to achieve the same softness.

Trapped Odor

Pepton, incidentally, was discovered in a curious way. A mercaptan drier at Calco Chemical Division's Bound Brook, N. J., plant was giving off an objectionable odor. The offending material, which was found deposited inside the equipment, was removed and sent off for analysis. The compound was then turned over to chemists who found it to possess desirable plasticizing characteristics. They not only found a use but they also eliminated the odor.

PHENOLIC MERINGUE

Foamed phenolic resin, described as "lightest solid known," is shipped liquid, foamed in place.

TEN TO TWENTY times lighter than the fluffy white meringue on a lemon pie, a new insulating material developed by Robert F. Sterling, a chemist at the Westinghouse Research Laboratories, consists of one part of phenolic resin to a hundred parts of air.

Secret of the extreme lightness—the foam weighs only 0.5-0.8 lbs. per cubic foot—is the low surface tension of the plastic material, which promotes the stability of very small bubbles.

Oxygen, Water, and HCHO

The foaming agent used with the resin is a combination catalyst and foamer which decomposes to yield oxygen and a condensation catalyst for the phenol-formaldehyde resin. Formaldehyde, water vapor and oxygen are given off when the base resin is mixed with the foaming agent. Temperatures required range around 180° C. and the time, from 5 to 15 minutes, depending on the size and thickness of the piece. During its formation the foam flows as a liquid, filling small, irregular spaces.

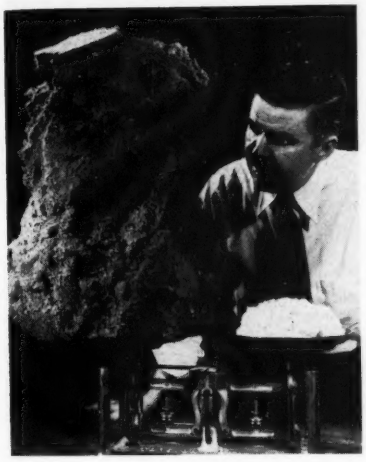
Thermal conductivity of the new insulating material is 0.2-0.3 BTU per sq. ft. per ° F. per inch. This compares favorably with glass wool, for example, with a range of 0.251-0.272.

Although the foamed insulation smells of formaldehyde immediately after manufacture, the smell soon disappears: The gases are replaced by air diffusing through the resin film or escaping through "tunnels" of connected bubbles.

Other properties of the material cited by Westinghouse: low water absorption; adherence to container; non-flammability (although it chars); and resistance to fungi, insects, and chemical attack.

No Air to Ship

Biggest talking point of the foamed phenolic, thinks Westinghouse, is the fact that it is foamed in place, thus eliminating the problems of shipping and storing bulky material. Although the



ROBERT STERLING: A little resin, a lot of air.

company's marketing policy has not yet crystallized, it expects to sell the resin and foaming agent to customers who will then make their own insulation.

The base resin (unmixed with foaming agent) will keep for 3 to 6 months at room temperature; the foaming agent will keep indefinitely. Once they are mixed, of course, the mixture must be used immediately unless it is refrigerated.

Many Uses Foreseen

Still fresh from the laboratory, the new resin hasn't yet been used commercially. Sterling predicts, however, that its low cost will win for it many applications: prefabricated metal wall sections, soft-drink coolers, household refrigerators, ships, and airplanes.

COLD-SET PHENOLIC

Acid-catalyzed phenol-formaldehyde coating eliminates baking.

PHENOL-formaldehye coatings that will set without the application of heat have been dreamed of and worked on by paint chemists on and off for years. The problem has been to find a suitable equivalent for heat that will speed up the condensation reaction between phenol and formaldehyde and still give a satisfactory film.

Last month L. Sonneborn Sons, Inc. introduced to the retail trade a product in which it felt it had the answer. Called Phenoplast, the new coating is a straight, unmodified phenol-formaldehyde in an isopropyl alcohol solvent. Each purchaser of a can of Phenoplast receives with it a small bottle of "mild acid" catalyst which is to be mixed into the paint just prior to use. If this is properly done, the coating dries tack-free in four hours, its makers claim, is hard enough to walk on in 24 hours, and reaches maximum hardness in 5 to 7 days.

Marine Tough

Phenoplast is not brand new. It already has almost two years of commercial service behind it in the tough proving ground of the marine field, where it has been used for both hull and deck protection. Hull coatings 18 months old are still as good as the day they were put on, according to Sonneborn.

The material may be applied by the same methods as any other paint. Containing 40% solids by volume, it gives a lustrous, transparent, light amber finish. It forms a permanent bond with wood and other porous materials that is stronger than the materials themselves. Acids, mild alkalies, moisture, heat, and all of the usual solvents except acetone are said not to affect it, and its abrasion resistance is claimed to be greater than that of any other cold-setting coating.

Applied to plaster-of-paris it imparts a finish that strongly resembles a baked ceramic glaze. For use on metals, a specially-prepared undercoater called Underpheno is required to provide the necessary bond.

Modest Beginning

Phenoplast has been a-borning for almost eight years. It all started back in 1941 when Andrew J. Lockrey, plastics chemist and author of "Plastics in the School and Home Workshop"* was teaching one of his workshop classes. The need arose for a hard, durable finish that could be applied to wood to give it a plastic-like appearance. Baked phenolics would do the job, but baking didn't lend itself very well to workshop use, so Lockrey decided to take a crack at the cold-set problem himself. The result is Phenoplast.

To introduce the material into the marine field, which seemed like a good place to start, Lockrey formed Phenoplast Corp. with entrepreneur Charles Roman, who had helped in the later stages of the development. This year, however, the potential of Phenoplast seemed to require larger-scale facilities than the Lockrey-Roman organization was able to provide, so all manufacturing and sales rights were turned over to L. Sonneborn Sons, which is now handling the product in its entirety.

Distribution Plans

Sonneborn already has Phenoplast on the shelves of a number of retail paint outlets, where it carries a price tag of $12.50 a gallon. It plans to extend distribution just as rapidly as possible. It is also pushing the material for industrial finishing and maintenance work, where it feels that long life and the cold-setting advantages will overcome the relatively high price of the paint itself.

Although no plasticizers or modifiers are used, Sonneborn feels that Phenoplast has successfully overcome the twin obstacles of extreme brittleness and dark color that have plagued past attempts to make a cold-setting phenol-formaldehyde. The secret, according to inventor Lockrey, is in the composition of the catalyst. No information has been made available on this, other than the fact that it is a "mixture of mild acids." Past work along similar lines has made use of a variety of acids, prominent among which have been sulfuric and phosphoric. In the case of Phenoplast, the alcohol solvent is said to act as an inhibitor on the catalyst, so that its full effect comes into play only with the evaporation of the solvent. This prevents the mixed

* D. Van Nostrand Co., Inc., New York, N. Y.

ROMAN & LOCKREY: For heat and pressure, mild acid.

material from "setting up" in the can for as long as a week or two if the can is kept closed.

Colors Later

At present Phenoplast is available in a clear formulation only, but Sonneborn has plans for a line of Phenoplast stains, and eventually pigmented finishes are expected to be available. The company is pushing its plans in the belief it has something good and also to maintain its lead over similar products it feels are bound to appear.

PARAFORM—NEW FORM

Direct competition between formalin and paraformaldehyde now promised.

PARAFORMALDEHYDE, the linear polymer of formaldehyde, is the latest product to come from Celanese Corp.'s hydrocarbon oxidation plant at Bishop, Texas. It represents another salvo in the company's battle against water. The first involved the use of bulk tanker shipping to make its formalin (37% water solution of formaldehyde) competitive in the big Eastern plastics markets.

As produced by Celanese, "paraform"

PARAFORM: Lower polymer, lower price.

has a lower molecular weight and greater water solubility than other paraformaldehydes now on the market. Its water content, however, is 10% instead of the standard 5%. Not the least of its differences is its price tag of 11¢ a lb. f.o.b. plant for a non-dusting flake material. This compares with a previous price of 24¢ for the 5% water material in powder form and for the first time brings "paraform" to a point where it is almost competitive with formalin. The latter is currently quoted at 3.5c per lb. Probably Celanese will make use of low-cost deep-water transportation for the new material.

GOLDEN HOPE

Mold-derived antibiotic, Aureomycin, now in commercial production by Lederle Laboratories.

IN THE less-than-a-decade since penicillin was rescued from obscurity "we have witnessed," says Lederle Laboratories, "greater progress in the control of the serious infections that afflict man and animals than has taken place in all previously recorded medical history."

Lederle takes justifiable pride in its part of that progress, for just a short while ago it started commercial production of a new antibiotic, Aureomycin—another link in the stout chain of defense scientists are fashioning against our microscopic enemies.

Where it Fits

Already penicillin, streptomycin, chloromycetin, and bacitracin have reached the large-scale production stage, and now Lederle has converted its penicillin facilities at its Pearl River, N. Y., plant to the manufacture of Aureomycin. The latter, like penicillin, is produced by deep-vat fermentation.

The antibiotic is a golden-yellow crystalline material derived from a previously unknown soil mold which has been named *Streptomyces aureofaciens*. It was discovered at the Pearl River laboratories last year by Dr. B. M. Duggar, who found it in one of the 3,400 cultures made from 600 soil samples garnered from all parts of the country.

Particularly outstanding is Aureomycin's versatility. It attacks not only Gram-positive bacteria, like penicillin, and Gram-negative organisms, like streptomycin, but also rickettsiae, weak viruses, and virus-like diseases.

Diseases caused by the latter group, and which are therefore controlled by Aureomycin, include Rocky Mountain spotted fever, Q fever, typhus, rickettsialpox and parrot fever; virus pneumonia; and various viral-like eye diseases. Bacterial diseases responding to the new drug include undulant fever, endocarditis, peritonitis, and many other infections.

No Resistance

Very often an antibiotic will work well for a time but finally the organisms, smarting under oppression, form an "underground" of resistance and break through the defenses. No evidence of this has been found with Aureomycin; resistant strains are apparently unable to develop.

Also in its favor: it is non-toxic at many times the normal dosage, and it can be taken effectively by mouth.

Lederle has great hopes for Aureomycin, not only in the treatment of human diseases, but also in veterinary medicine.

B. M. DUGGAR: Another link in the chain.

But in its enthusiasm for the new drug, it hasn't lost sight of the farther goals. Says Duggar: "We are inspired with the greater hope that the viruses as a class may in time be fought successfully with antibiotics."

CHEMSTRAND CORP.

Monsanto and American Viscose join forces to pursue fiber research.

A NEW contender backed by the resources of two process industries giants has entered the fast-growing and competitive synthetic fibers field. Formed jointly last month by Monsanto Chemical Co. and American Viscose Co., the new organization, christened Chemstrand Corp., will devote its efforts for the present exclusively to research and development on new synthetic fibers.

The company presumably will take over fiber research programs that have been under way in the laboratories of both parent organizations. It will occupy working space in the Monsanto laboratories at Dayton, Ohio, and those of American Viscose at Marcus Hook, Pa. The latter company is a leading manufacturer of viscose and acetate type rayons. Monsanto has not previously been identified with the synthetic fibers field but is a major supplier of chemicals to the textile industry.

Dr. Carroll A. Hochwalt of Dayton, a Monsanto vice president, heads the new company. Other officers are Dr. Charles S. Venable, of Philadelphia, director of chemical research for American Viscose, who is vice president, and F. William Koster, also of American Viscose, who is secretary-treasurer.

Members of the board of directors include William M. Rand of St. Louis, president of Monsanto; C. A. Thomas, St. Louis, Monsanto executive vice presi-

dent; Dr. Hochwalt; Charles S. Cheston of Philadelphia, Monsanto board member; Dr. F. H. Reichel of Philadelphia, chairman and president of American Viscose; Dr. Venable; and Charles S. McCain and William Ewing of New York, directors of American Viscose.

MINI-SPINNER

Laboratory-size spinning column fractionates 10-milliliter samples.

IN RESEARCH work on small units, precise analytical fractionation must often be performed on very small samples, and a simple laboratory column to conduct such fractionations would be a very desirable addition to most laboratories. The design of such a column was recently reported at the ACS meeting in San Francisco by A. V. Cruthirds, W. C. Jones, and W. D. Seyfried of the Humble Oil Co. in Baytown, Texas. The column is essentially a glass tube in which a suspended metal band is rotated at high speeds.

"Spinning band" columns have been reported before, but generally they have been too complex or have had too low a number of theoretical plates or too high a hold-up. The column reported by the authors overcomes these difficulties sufficiently well to recommend it strongly.

A 2-foot column was found to be equivalent to 11 theoretical plates, to have an operating hold-up of only 2 ml. and a static hold-up of only 0.2 ml. Samples as small as 10 ml. can be fractionated when a chaser liquid is added to the sample. A 4-foot column was also successfully operated, giving twice the fractionation efficiency, but approximately 4 times the hold-up.

Simple Construction

The column is simple, rugged, and easily constructed. A smooth-bore pyrex tube of 6.5 mm internal diameter is vacuum-jacketed and fitted with a ¼" Chromel band, giving an annular clearance of only 0.07 mm—an important factor in successful operation. The band is rotated by an air motor at 1800 rpm. Higher speeds of rotation—up to 6000 rpm—were found to give little advantage. The shaft connecting the Chromel band and the motor passes through a packing gland built into the column head, the main part of the head being offset from the axis of the column.

A vacuum column was also constructed in which a magnetic drive was used to spin the rotor. It was successfully operated at pressures as low as 0.1 mm.

The simplicity of the column is such that only a few hours are required to train operators in its use. The column approaches equilibrium very rapidly (in approximately 30 minutes) and is capable of adequately fractionating a sample at a rate of one per cent a minute. Because of these features the column has found considerable use in plant-control operations, where larger columns require a much longer time to come to equilibrium and completely distill the sample.

FISSILE FIZZLE?

Atomic Energy Commission searches out grist for atomic mill.

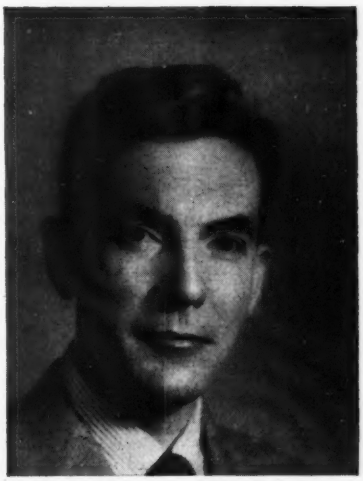
NOBODY paid too much attention to uranium when it was used only for coloring pottery and artificial teeth. At that time the magic metal of the atomic age was useful mainly as an indication that where it was, there was radium also.

All that has been changed since 3½ years ago, and now the Atomic Energy Commission's geological experts are appraising the uranium supply, wondering whether there is enough to sustain present high hopes for the atom, or whether the hoped-for golden age will fizzle for lack of fissile atoms.

Plenty, Says AEC

The latter possibility, it appears, is causing little concern among those who know uranium best: "In my judgment," said J. K. Gustafson, manager of AEC's raw materials operations to a group of metallurgists at M.I.T. recently, "the estimates of future uranium supplies that I have seen are far too pessimistic."

His optimism rests on a solid foundation 200 miles in diameter out in Colorado, where thousands (the AEC lets it go at that) of tons of carnotite ore contain from 0.1 to 0.3 per cent of uranium oxide as the canary-yellow hydrate of potassium uranium vanadate. Along the edges of the Colorado Plateau, newly-found deposits of uranium-copper ore, similar in size and occurrence to the uranium-vanadium ores, are of commercial promise.



J. K. GUSTAFSON: Fie on pessimists.

Although the Colorado deposits are the only extensive ones in this country, there are others elsewhere. Some of these localities are already famous for their radium output, and they should therefore provide large quantities of uranium. (Radium occurs with uranium in the proportion of 1:2,940,000.)

Additional large quantities are promised from new properties in Canada. Meanwhile, the Minister of Industrial Production of the Union of South Africa has said, "We believe that the Union of South Africa may produce more uranium than any other country of the world."

Largely neglected by many experts, thinks Gustafson, is the great surge of uranium prospecting now going on in all parts of the world. "After all, man has only just begun to look for uranium." He also thinks that estimation of total supply on the basis of known reserves is fallacious—as has been the case with petroleum and other minerals.

Better Technology

Most metals have gone or are going through a phase where high-grade deposits are the only ones commercially utilized at first, and then gradually large, lower-grade sources yield to technical ingenuity and become important producers; and uranium will probably be no exception. A copper ore, for example, had to assay 2 per cent a few years ago before anyone would bother mining it. Now Anaconda Copper Mining Co. is raising capital to exploit an 0.8 per cent ore by underground mining methods. The AEC is sponsoring laboratory studies on improved radioactive instruments, techniques, and new processes for economically treating low-grade ores.

Insurance Policies

The AEC is doing all it can to insure the best utilization of domestic ores by guaranteeing minimum prices and offering bonuses for ore discoveries

Exploration activities, carried out in large part by the U. S. Geological Survey for the AEC include comprehensive geological studies; examination of mine dumps, mill tailings, smelter slags, etc.; logging of oil and gas well holes; and spot examination of all reported ore finds.

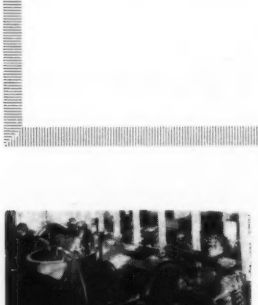
All in all, it appears that when the atomic energy age arrives, the AEC will have taken the necessary steps to assure its lasting progress.

A CI REPORT ON

AMMONIA

Part I: U.S. Production Facilities

by WILLARD C. COPE
Washington, D. C.



SINCE ITS BIRTH IN 1921 the synthetic ammonia industry has become a giant capable of producing nearly 3.5 billion pounds per year. Its nineteen plants, located in twelve states, obtain about 55% of their hydrogen from coke and about 40% from natural gas. The remainder is by-product material from caustic-chlorine operations.

SYNTHETIC ammonia production capacity in the United States is now over three billion pounds a year. This represents a 480% increase since 1939, and it is still growing.

All of the plants built during World War II (capable of synthesizing nearly two billion pounds annually) are now supplying peacetime demands. More than half of these plants have been sold outright; the Government retains title to the remainder, which, with the exception of the Tennessee Valley Authority plant at Wilson Dam, Ala., are operated on contract or under lease by private industry for the Army.

FIRST DEVELOPMENT IN U. S.

Synthetic ammonia plants in this country and Canada are all based on the pre-World War I discovery by Fritz Haber in Germany that nitrogen and hydrogen will react under high pressure and temperature in the presence of a catalyst to form ammonia. The process is generally termed the Haber-Bosch process, as Bosch was the engineer who transposed it from laboratory to large-scale production. Many improvements have been made, and now there are ten well-recognized variants of the process.

Although about thirty tons of ammonia per day were being produced by this process in Germany as early as 1913, it was not until 1921 that the first successful ammonia synthesis unit—Atmospheric Nitrogen Corp.'s Syracuse, N. Y., installation—was erected in the United States. (At that time Atmosphere Nitrogen was a subsidiary of the General Chemical Co. and Solvay Process Co., which later became part of Allied Chemical and Dye Corp.) This unit utilized De Jahn's modification of the original Haber-Bosch process. The plant succeeded in overcoming the technical and operational deficiencies of the U. S. Nitrate Plant No. 1, erected by the Government at Muscle Shoals, Ala., during World War I. The Syracuse plant is no longer in operation, having been succeeded by a huge plant at Hopewell, Va.

The first large commercial installation which has remained in operation until the present day is that of E. I. du Pont de Nemours and Co. at Belle, W. Va. This plant, built in 1926, is based on hydrogen from coke and steam by the water gas reaction. It was followed in 1928 by Allied Chemical and Dye Corp.'s Hopewell, Va., plant. A unit was completed the same year for Commercial Solvents Corp. at Peoria, Ill., to utilize the hydrogen formed incidental to n-butanol and acetone production. After this had operated a short time, however, it was converted to methanol.

In 1931 Shell Chemical Co. at Shell Point, Cal., completed the first American plant to use natural gas as a source of hydrogen. Hercules Powder Co.'s plant, which was constructed at Pinole, Cal., in 1940, also uses natural gas. Five smaller plants were erected from 1926-1932, using by-product hydrogen from electrolytic caustic soda and chlorine. These nine plants had an estimated capacity of 459,000 tons per year, which, when combined with ammonia from by-product coke operations and imports of fixed nitrogen, was sufficient for all industrial and agricultural requirements.

PREWAR PLANTS

The plant of the Solvay Process Division of the Allied Chemical and Dye Corp. at Hopewell, Va., represented well over fifty per cent of the prewar synthetic ammonia capacity. It operates at about 3,000 psi. The hydrogen utilized in the synthesis is prepared from coke and steam, coke being shipped from the company's ovens in Ohio and Kentucky. Power is generated on the premises. In addition to synthetic ammonia, ammoniating fertilizer solutions, sodium nitrate, nitrosyl chloride, and other nitrogen-bearing chemicals are produced.

The main plant of E. I. du Pont de Nemours and Co. at Belle, W. Va., 10 miles east of Charleston, represented over thirty per cent of prewar synthetic ammonia capacity. Since units of this plant can be converted readily to synthetic methanol or ammonia, partial conversion of the synthetic methanol plant there increased production during the war to an estimated 200,000 tons a year. It is reported that the plant has operated efficiently with half the high-pressure compressors on ammonia and half on methanol.

The Belle plant is designed as a combination of the Claude and Casale processes and operates at 15,000 psi and about 500°C. The Claude process, named after its French inventor, operates at 13,500-15,000 psi, and 500-650°C. without recirculation of gases. Because of this latter feature, the system is noted for the compactness and simplicity of its converter. The Casale process was patented by the Italian inventor, Luigi Casale. A special converter operates at 500°C. and 9,000 psi with recirculation of synthesis gas. Du

Pont utilizes gas recirculation, usually at pressures intermediate between those used by Claude and Casale.

Hydrogen is produced from coke manufactured on the site from coal brought in by barge on the Kanawha River from neighboring mines. Power is purchased from Appalachian Power Co. Principal products are synthetic ammonia and methanol, urea, urea-ammonia fertilizer solutions, ammonium carbonate, ammonium bicarbonate, and other organic chemicals.

Du Pont's Niagara Falls plant produces synthetic ammonia for sale and for the company's sodium cyanide requirements. The plant, operating at 4,500 psi and 475°C., uses by-product hydrogen from salt electrolysis and hydrogen from the production of sodium cyanide from sodamide, a process developed by the Fixed Nitrogen Research Laboratory of the U. S. Department of Agriculture.

The Shell Chemical Co.'s ammonia plant at Shell Point, Cal., uses the Mont Cenis system, named for the location of the first plant in Germany. The system operates at 1,500 psi, using a special iron cyanide catalyst. Hydrogen is produced from natural gas. Shell production was increased during the war and has been further expanded in the postwar period. Principal products are ammonia and ammonium sulfate.

The Hercules Powder Co. installation, located at its Pinole, Cal., explosives plant, also operates on hydrogen from natural gas. This plant produces about 35 tons of synthetic ammonia a day, and is now doubling its capacity. It uses the process of the l'Air Liquide Societe, which holds the Georges Claude patents and operates in all parts of the world except the United States. This plant operates at 13,500-15,000 psi and 500°C. Products are ammonia, nitric acid, mixed nitric and sulfuric acids, and ammonium nitrate for use in explosives.

The four remaining prewar synthetic ammonia plants operate on by-product hydrogen from electrolytic caustic and chlorine. These are smaller units which are able to compete with larger installations because of the low cost of this by-product hydrogen. None of the ammonia is converted to other products; all is produced for sale.

Of these four, Midland Ammonia Works, Midland, Mich., uses the American System; Mathieson Chemical Corp., Niagara Falls, N. Y., uses the Nitrogen Engineering Corp. (NEC) process; Great Western Electrochemical Division of Dow uses the NEC process; and the Pennsylvania Salt Manufacturing Co., Wyandotte, Mich., uses the Mont Cenis System.

The NEC process operates at 4,500 psi, and 510-525°C. American Cyanamid Co., through its subsidiary, Chemical Construction Corp., has installed this system in India, Norway, Mexico, Japan, Egypt, Canada and in the two plants in the U. S. mentioned above.

CANADIAN PLANTS

The Canadian nitrogen fixation industry* exports about ninety per cent of its production, much of it going to the U. S. and Hawaii. The industry began in 1909, when a plant was built at Niagara Falls, Ont., by American Cyanamid Co. to produce 5,000 tons per year of calcium cyanamide. Subsequent additions and improvements have brought its capacity up to 300,000 tons of cyanamide a year, one of the largest in the world. Cyanamide is readily converted to ammonia, but because of the large demands for power, lime and coke, this process cannot compete with the modified Haber-Bosch processes. However, cyanamide, with practically no further treatment, is a source of agricultural nitrogen and is a useful chemical intermediate.

In 1930, the Consolidated Mining and Smelting Co. embarked on a nitrogen fixation and fertilizer program at Trail, British Columbia. By-product sulfuric acid was to be converted to phosphate fertilizers, together with ammonium sulfate and phosphates containing nitrogen. For this purpose, Consolidated erected a synthetic ammonia plant based on the Fauser process, using electrolytic hydrogen from power developed on the Kootenay River and hydrogen from water gas.

The Fauser process, patented by Dr. Giacomo Fauser of Italy, operates at 3,500 psi and 500°C. It is distinguished by an original type of cell for producing electrolytic hydrogen and an electrically heated converter for accurate temperature control.

In the decomposition of water by direct current, oxygen is produced as well as the desired hydrogen. At Trail this is utilized to enrich the air for the coke water gas facility. Waste effluent gases from the ammonia oxidation units used in nitric acid production are another source of nitrogen.

The prewar capacity of Trail was 35,800 tons of anhydrous ammonia per year. Since then, additional electrolytic hydrogen facilities have increased this by 18,000 tons annually and a coke-hydrogen installation by another 39,600 tons. The estimated wartime production of this plant was 93,400 tons of anhydrous ammonia a year. Principal products are ammonia, ammonium sulfate, ammonium nitrate and ammonium phosphates.

The only other prewar plant was that of Canadian Industries, Ltd., located at Sandwich, Ontario, having an annual production of 2,500 tons of ammonia derived from by-product electrolytic hydrogen from chlorine-alkali operations.

In the Spring of 1940, Great Britain, whose own sources of nitrogen were within bombing range of Germany, requested Canada to create a reserve supply of nitrogen from ammonium nitrate manufacture. Two plants were located at Calgary, Alberta, and Welland, Ontario. Although these plants were built as reserves, the main British plant at Billingham was not put out of commission but operated continuously.

Natural gas is the hydrogen source for Mathieson's ammonia synthesis unit at Lake Charles, La.

Alberta Nitrogen Products, Ltd., plant at Calgary has a capacity of 230 tons a day of anhydrous ammonia. The hydrogen is produced from natural gas and steam by the method Imperial Chemical Industries developed in Great Britain. This plant was engineered by Chemical Construction Co. and uses the NEC process for synthesis. Principal products are ammonia and ammonium nitrate made by the prilling method.

Welland Chemical Works, Ltd., has a capacity of 120 tons a day of anhydrous ammonia from which 250 tons of ammonium nitrate can be produced. It was originally intended to use this ammonium nitrate and dicyandiamide to produce guanidine nitrate for shipment to England to be processed to nitro guanidine. This plant, also engineered and constructed by Chemical Construction Co., uses the NEC process. Since the war, it has been purchased by the American Cyanamid Co.

WORLD WAR II PLANTS

Military explosives for World War II required a vast expansion of fixed nitrogen

* For further details see "Canada's Nitrogen Industry," S. R. Frost, *Canadian Geographical Journal*, Sept. 1945, p. 106.

capacity. Synthetic ammonia capacity was nearly tripled both by increases in capacity of existing plants and by ten new plants, the latter by far the greatest factor in the increase. These plants were built with Government funds, one by the Defense Plant Corp. at Lake Charles, La., one by the Tennessee Valley Authority at Muscle Shoals, Ala., and eight by the Ordnance Department of the Army at Morgantown, W. Va.; South Point, Ohio; Henderson, Ky.; Louisiana, Mo.; Pittsburgh, Kan.; El Dorado, Ark.; Sterlington, La.; and Etter, Texas.

A major problem was how to provide an adequate supply of hydrogen—whether by electrolysis of water or from natural gas or coke and steam. Electrolytic hydrogen was too expensive as it would require 40,000 KWH to produce 100 tons of ammonia daily. Natural gas appeared attractive, but only one plant, Shell Chemical Co.'s, was using this method, and lack of widespread experience made its desirability questionable. Coke was recommended because it had been the source of hydrogen for many years at large ammonia synthesis plants and city gas works. In this process, hydrogen and carbon monoxide (water gas) are formed by alternate injections of air and steam through hot coke. The carbon monoxide produced is later converted into carbon dioxide by passing the gas mixed with steam over an iron oxide catalyst, thereby releasing hydrogen equivalent to the carbon monoxide content. On the other side of the ledger was the considerable time required to build by-product coke plants if coke supplies became short. Also, large amounts of coal would be required, since as high as three tons of coal are needed per ton of ammonia, exclusive of that for electric power generation.

The initial reports of a sub-committee of the Manufacturing Chemists Association, appointed to study the nitrogen problem for the Government recommended that the ammonia plants be constructed near a good water supply (100,000 gallons are required per ton of ammonia, not including that needed for electric power generation); near a coal field with river barge transportation; in a good skilled labor area; and in an area with sufficient electricity from utilities. The latter was especially important as 140,000 KWH are required to produce 100 tons of ammonia daily.

After further study and planning by the Army and Navy Munitions Board, War Production Board and its predecessors, four ammonia plants using coke and six using natural gas as the hydrogen source were erected. The government decided to base the majority of plants on hydrogen from natural gas because the ammonia plants were to service explosives plants scattered throughout the Midwest and Southwest, away from coke supplies in the East.

At the war's end, five ammonia plants were either sold outright for commercial use or leased and later sold by the War Assets Administration. Five others were retained by the government or withdrawn from surplus by the Army. All ten plants cost over $250 million. The five plants sold cost $131 million, had a fair value* of approximately $53 million and returned roundly $47 million at their sale.

Spencer Chemical Co. produces methanol and ammonia at the former Jayhawk Ordnance Works.

The five plants sold have a capacity of 529,000 tons ammonia a year, which is greater than the 1941 annual commercial production** of 518,000 tons and almost equal to the 1942-1943 and 1944 average commercial production of 552,000 tons. The sum of the new industrial capacity of 529,000 tons and former commercial capacity of 552,000 tons plus additional capacity installed at South Point, O., by Solvay and under construction at El Dorado by Lion will provide 1,500,000 tons of anhydrous ammonia a year for commercial use.

This additional ammonia is being used for: (1) Fertilizer solutions consisting of ammonia, ammonium nitrate and water; (2) Solid ammonium nitrate; (3) Solid ammonium sulfate; (4) Liquid ammonia for direct application to the soil as a fertilizer; (5) Ammonium phosphate; (6) Sodium nitrate; (7) Urea; and (8) Source of nitrogen in chemical synthesis.

Of the five Government ammonia plants retained or withdrawn from surplus, the Tennessee Valley Authority plant at Wilson Dam, Ala., was considered a commercial producer by the War Production Board since fertilizer grade ammonium nitrate produced there was sold to U. S. consumers through cooperatives. Morgantown, Cactus and Ohio River Ordnance plants are being operated for the Army fertilizer program. However, Phillips Petroleum Co., the present lessee, may channel Cactus Ordnance production into commercial use after supplying the Army's fertilizer requirements. Phillips is obligated to finish a second 150-ton-per-day ammonia line which will double present capacity. Since the Army may not require fertilizer after three or four years, 130,000 additional tons of anhydrous ammonia a year will then be available for commercial use.

Thus, in about four years 1,550,000 short tons a year of anhydrous ammonia may be produced. An obvious question is whether there will be a surplus of ammonia and nitrogenous fertilizer materials. On the consumption side there is a constantly growing population. Farmers have learned that increased fertilization will pay and that many areas require more nitrogen now than in the past when the soil was semi-virgin. Increased fertilization can also reduce farm labor costs by enabling a farmer to cultivate fewer acres for an equivalent crop. Our export market has increased materially in recent years and should increase further due to less competition from former suppliers. An imponderable, however, is the fate of the huge—at present unused—capacity of the German fixed nitrogen industry.

BUCKEYE ORDNANCE

This plant at South Point, O., was sold June, 1946, for $12,500,000, to Solvay Process Div. of Allied Chemical and Dye Corp. Buckeye was designed to include four 150-ton-a-day ammonia units, facilities for manufacture of nitric acid from ammonia by the ammonia oxidation process, and capacity for 24,000 tons per month of ammonium nitrate solution. Only two of the 150-ton units were in operation during the war. Production equipment of units #3 and #4 was estimated to be only 55% and 23% complete, respectively, at the time of the sale, but since then unit #3 has been completed for ammonia, and unit #4, reportedly, for production of 45,000 gallons per day of methanol. Solvay spent its own funds to complete the plant and also purchased spare parts, construction stores and consumer-type goods of approximately $550,000 value from the Government.

* Fair Value as defined by War Assets Administration: "Fair Value shall be considered to be the maximum price which a well informed buyer acting intelligently and voluntarily, would be warranted in paying if he were acquiring the property for long-term investment or for continued use with the intention of devoting it to a profit making purpose which represents the most productive type of use for which the property is suitable."

** Commercial production does not include that from the Government-owned plants.

SYNTHETIC ANHYDROUS AMMONIA PLANTS

Company	Location	1st Year Operation	Process	Source of Hydrogen	Est. Capacity Tons/Yr. Pre-War	Est. Capacity Tons/Yr. Wartime
UNITED STATES						
Solvay Process Division (Allied Chem. & Dye Corp.)	Hopewell, Va.	1928	Atmospheric Nitrogen Corp.	Coke from Ohio & Ky.	250,000	255,000
E. I. duPont de Nemours & Co.	Belle, W. Va.	1926	Claude-Casale	Coke made on premises	146,000	200,000
Shell Chemical Co.	Shell Point, Cal.	1931	Mont Cenis	Natural Gas	27,000	36,000†
Midland Ammonia Works	Midland, Mich.	1930	American	By-Product	9,000	15,000
Mathieson Chemical Corp.	Niagara Falls, N. Y.	1925	Nitrogen Engr. Corp.	By-Product	5,800	7,000
Pennsylvania Salt Mfg. Co.	Wyandotte, Mich.	1932	Mont Cenis	By-Product	4,900	12,000
E. I. du Pont de Nemours & Co.	Niagara Falls, N. Y.	1926	American	By-Product	4,500	9,000
Great Western Division (Dow Chemical Co.)	Pittsburgh, Cal.	1927	Nitrogen Engr. Corp.	By-Product	1,100	4,000
Hercules Powder Co.	Pinole, Cal.	1940	L'Air Liquide	Natural Gas	10,900	12,000
Total — UNITED STATES					459,200	550,000
CANADA						
Consolidated Mining & Smelting	Trail, B. C.	1930	Fauser	Electrolysis and coke	35,800	93,400
Canadian Industries, Ltd.	Sandwich, Ont.	1930	Modified Haber	By-Product	2,500	2,500
Alberta Nitrogen Products, Ltd.	Calgary, Alberta	1941	Nitrogen Engr. Corp.	Natural Gas	.....	82,800
Welland Chemical Works, Ltd.	Welland, Ont.	1941	Nitrogen Engr. Corp.	Coke	.....	43,200
Total — CANADA					38,300	221,900
PRIVATELY OWNED					*1944*	*Present or Planned*
Allied Chemical & Dye Corp. (Solvay Process Div.)	South Point, O.	....	Atmospheric Nitrogen Corp.	Coke	137,000	200,000
Commercial Solvents Corp.	Sterlington, La.	....	M. W. Kellogg Co.	Natural Gas	59,000	59,000
Lion Oil Co.	El Dorado, Ark.	....	Chemical Constr. Corp.	Natural Gas	155,000	208,000
Mathieson Chemical Corp.	Lake Charles, La.	....	M. W. Kellogg Co.	Natural Gas	*	63,000
Phillips Petroleum Co.**	Etter, Texas	....	Chemical Constr. Corp.	Natural Gas	65,000	130,000
Spencer Chemical Co.	Pittsburgh, Kans.	....	Chemical Constr. Corp.	Natural Gas	127,000	160,000
Total — PRIVATELY OWNED					543,000	820,000
GOVERNMENT OWNED						
Morgantown Ordnance Works (Heyden Chem. Co.)	Morgantown, W. Va.	....	Claude-Casale	Coke	174,000	174,000
Ohio River Ordnance Works. (Solvay Process Div.)	Henderson, Ky.	....	Atmospheric Nitrogen Corp.	Coke	69,000	69,000
San Jacinto Ordnance Works (Hercules Powder Co.)	Houston, Texas	....	L'Air Liquide	Natural Gas	62,000***	22,000
Tennessee Valley Authority	Muscle Shoals, Ala.	....	American	Coke	66,000	66,000
Total — GOVERNMENT OWNED					371,000	331,000
TOTAL — UNITED STATES					.....	1,701,000
TOTAL — CANADA					.....	221,900

* Began operation Sept. 1944.
** Operating under long term lease from Government.
*** Three of five original units now used for Bureau of Mines synthetic fuel research.
† Hearing before House Sub-Committee on Agriculture gives current capacity as 75,000 tons/yr.

The company is also now constructing facilities at this plant for production of urea (*CI, April, 1949, p. 559*).

The South Point plant complements Solvay's Hopewell, Va., plant since it can supply the Chicago and St. Louis markets with ammonia and is close to midwest and southern fertilizer markets. Its principal disadvantage is that the plant operates on hydrogen from coke, and therefore has a higher production cost than the plants in Kansas, Arkansas and Louisiana which use natural gas. Natural gas prices, however, are on the increase. New contracts near gas gathering lines are quoted at 9½ cents and up per 1,000 cubic feet, and 18 to 20 cents near the Ohio River.

Advances in construction costs of approximately 37% since this plant was purchased in 1946 make the original cost of $13 million equivalent to more than $17 million today. In 1944, 137,000 tons of ammonia were produced, excluding unit #3, which was completed after purchase. Present annual capacity is somewhat over 200,000 tons.

DIXIE ORDNANCE

Dixie Ordnance at Sterlington, La., was originally engineered for 600 tons a day of anhydrous ammonia, later reduced to 300 tons and at completion, to 150 tons. Certain buildings, concrete foundations for support of equipment, and facilities for utilization of low-cost waste hydrogen from the adjacent Thermatomic Carbon plant were constructed, but not used during wartime operation and reflect only higher construction cost. Dixie differs from the Jayhawk and Ozark Ordnance Works in its use of the Girbotol process for removal of carbon dioxide from the nitrogen-hydrogen gas mixture, instead of water scrubbing. This requires less power and avoids the 3-4% hydrogen loss common to the scrubbing method. Compressors are steam driven and fuel is natural gas from the nearby Monroe gas field.

During the war this plant produced only synthetic anhydrous ammonia. No facilities were installed for nitric acid or ammonium nitrate manufacture. Greatest ammonia production was 59,000 tons of ammonia in 1944.

Commercial Solvents Corp. purchased the plant in July, 1946, for $5,850,500, and has since installed facilities to produce 45,000 gallons of methanol a day. Due to the advance of construction costs since 1946, the price paid for this property is equivalent to $8,000,000 today.

This plant has the advantage of low-cost ammonia production and proximity to consuming markets of Mississippi and East Texas, where large tonnages are used to make fertilizer. Ammonia has recently been applied to certain soils by direct application. In 1947 over 200,000 acres of cotton and corn land were fertilized in this manner, and the excellent results obtained give promise of further applications.

JAYHAWK ORDNANCE

The Jayhawk Ordnance unit at Pittsburg, Kans., was designed for production of 300 tons of anhydrous ammonia a day to be used for nitric acid and water solutions of ammonium nitrate. Hydrogen is produced from natural gas and compressors are operated by steam raised with coal. Ammonium nitrate is shipped in tank cars as an 80% water solution to Ordnance graining plants where it was converted to solid ammonium nitrate. In 1946, facilities for additional nitric acid, agriculture fertilizer solution, aqua ammonia, methanol and dry ice, the lat-

ter a byproduct of ammonia synthesis, were added at Government expense. Largest wartime production was 127,000 tons of anhydrous ammonia in 1944.

The plant was first leased to Spencer Chemical Co. (formerly named The Military Chemical Works, Inc.), the wartime lessee, based on rents payable on a per cent of net sales for a period of five years with the option of extending the lease fifteen additional years. Spencer also had an option to purchase the plant at any time within ten years, beginning with the third year of the lease agreement. This option was exercised in May, 1948; the price was $11,010,000. (*CI, July, 1948, p. 28.*)

Located in an area of large consumer demand for fertilizer chemicals, methanol and dry ice, the plant is a low-cost producer. There were many misgivings in early 1946 as the mid-west consumer demand for fertilizer had not developed greatly and it was expected that long rail hauls would have to be made to southeastern and southern points. Since that time, however, nearby demands have developed to such an extent that long rail hauls to market are unnecessary.

According to a recent announcement, Spencer will increase ammonia production by 30,000 to 40,000 tons a year. The program also includes plans for increasing methanol capacity slightly and operation of a plant at Parsons, Kans., to grain ammonium nitrate for fertilizer use.

MATHIESON

The Lake Charles plant was sponsored by the War Production Board and built by Defense Plant Corp. for production of anhydrous ammonia, nitric acid and ammonium nitrate water solution. No facilities for grained ammonium nitrate were installed. The plant is similar to Dixie Ordnance with production of hydrogen from natural gas, steam power for operation of compressors and auxiliary equipment, and gas for fuel. Carbon dioxide is removed from synthesis gas by the Girbotol process as at Dixie.

The property was leased to Mathieson Chemical Corp., successors to Mathieson Alkali Works, the wartime lessee, with rents payable based on a percentage of net sales. Mathieson purchased the property in July, 1948, for the fair value, $7,063,000, which was inclusive of $1,665,400 capital expenditures installed at lessee's expense.

The ammonia plant was completed in the fall of 1944 and operated until September, 1945, the end of the war. It was not a good producer because of poor conversion of the synthesis gas to ammonia in an up-draft converter which broke the catalyst at the space velocity required for capacity operation. The converter was later changed to down-draft and other alterations were made which transformed the plant into a steady producer with an estimated annual output of 63,000 tons of ammonia.

At present the plant is producing only ammonia, but it can produce nitric acid and ammonium nitrate solution. Byproduct carbon dioxide is piped to the adjacent alkali works, also owned by Mathieson, for use in soda ash production. Potential products are sodium nitrate from nitric acid and soda ash, ammonium sulfate, fertilizer solution containing ammonia and ammonium nitrate, and aqua ammonia.

The plant has relatively low production costs because of low natural gas costs and its location near a large ammonia-consuming market in East Texas and areas with soils appropriate for direct application of ammonia. Water transportation is available at Lake Charles for barge shipments to inland points and deepwater overseas shipments.

OZARK ORDNANCE

The Ozark Ordnance plant was designed for 300 tons per day of anhydrous ammonia to form nitric acid and water solution of ammonium nitrate. Hydrogen is prepared from natural gas and synthetic gas is compressed by gas-driven compressors. Carbon dioxide is removed by water scrubbing and carbon monoxide, by ammoniacal copper formate solution. During the war, some ammonia was neutralized with nitric acid to produce an 80% ammonium nitrate water solution for shipment to Ordnance graining plants for conversion to solid ammonium nitrate.

The property was leased to Lion Oil Co. in early 1946 at a rental based on net sales with an option to purchase (*CI, April, 1948, p. 567*). Subsequent to the date of lease, three additional nitric acid production units were installed and other capital improvements made at lessee's expense for production of solid ammonium nitrate by prilling — crystallization by evaporating droplets of a saturated solution as they pass down an eighty-foot tower.

This plant was sold to Lion in 1948 for $10,500,000 cash and is now being operated at maximum capacity. According to the purchaser's annual report, synthetic ammonia production was 161,650 tons in 1947 and 162,663 tons in 1948—a daily rate of 450 tons. With additional capacity now under construction, annual ammonia capacity should reach 208,000 tons.

Cactus Ordnance Works at Etter, Texas, is now operated by the Phillips Petroleum Co. under long term lease. Liquid ammonia is shipped to Houston for conversion to ammonium sulfate.

CACTUS ORDNANCE

This plant was originally envisioned as three 150-ton-a-day ammonia production lines but was engineered as two 150-ton lines and only one 150-ton line was completed. The other was only partially completed. At one time during the war it was believed that no production would be required from Cactus and construction work was stopped, but later on was resumed and the plant was finished in 1945. It produced 3,069 tons during June, July, and part of August, 1945, when lower ammonia requirements forced a shutdown. However, during the war, part of the plant was adapted to production of cumene substitute (CS).

Cumene, isopropylbenzene, is a constituent of high octane aviation gasoline that was in short supply during the war. It was found that a substitute produced by hydrogenation of nitroxylenes to xylidines (dimethylanilines) could replace cumene and this was given the name cumene substitute or "CS." Considerable

quantities of CS* were made at Cactus during the war (*Chemical Engineering, Oct., 1948, p. 124*).

The property has a housing project estimated to have a replacement cost of approximately $1,890,000, plus land, improvements, buildings, machinery and equipment. The operating line was estimated by an appraiser as having a fair value of $5,749,000 and the unfinished line to have a fair value of $1,017,000.

Cactus Ordnance was declared surplus October, 1945, and withdrawn from surplus July, 1946, and rehabilitated for production of ammonia for Army foreign requirements under an agreement with Spencer Chemical Co.

The Army leased Cactus July, 1948, to Phillips Petroleum Co. for a period of 15 years with option of extension for two additional 5-year periods. The lessee proposes to make capital expenditures for increased production, estimated by it at $16,000,000, and will complete the second 150-ton-a-day unit and facilities for nitric acid and ammonium nitrate production. It has been reported that the Army will furnish the ammonia oxidation units for nitric acid production from surplus equipment.

Phillips has provided buildings and facilities to convert some of the ammonia produced into ammonium sulfate at a Gulf Coast location and will purchase the necessary transportation equipment to implement the program.

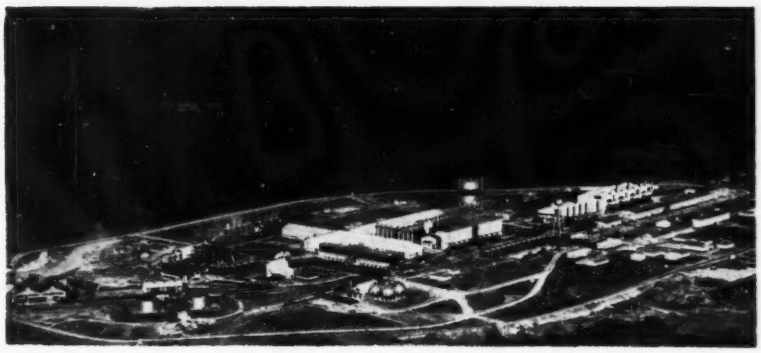
MISSOURI ORDNANCE

The Missouri Ordnance works, designed to produce 150 tons a day of anhydrous ammonia, was placed in operation November, 1942. However, the plant produced 62,000 tons ammonia in 1944, equivalent to 170 tons a day. Hydrogen for synthesis is prepared from natural gas, and compressors and auxiliary equipment are operated by electric power. The process equipment used at this plant is covered by patents held by L'air Liquide Corp., and is of French design for operation at 15,000 psi. Hercules Powder Co. was the wartime operator of this works.

Two 30-ton-a-day units with an actual cost of $2,008,000 were declared surplus April, 1948, but were withdrawn August, 1948, by the Army for re-erection at San Jacinto Ordnance Depot, Houston, Tex., where they were to be operated by Hercules. The remaining three 30-ton ammonia units have been incorporated into the Experimental Fuel Plants, recently dedicated by the U. S. Bureau of Mines at Louisiana, Mo. They supply hydrogen for hydrogenation of coal and carbon monoxide.

Ammonia from the re-erected units is to be converted by a private plant to ammonium sulfate for the Army fertilizer program.

* Some insist that "CS" originally stood for "completed stock" not "cumene substitute."—Editor.



Lion Oil's ammonia plant at El Dorado, Ark., is the largest to use hydrogen from natural gas.

MORGANTOWN ORDNANCE

The Morgantown ammonia plant was designed for production of 486 tons a day of ammonia, and during 1943 produced 174,000 tons. Hydrogen is produced from coke, and power, from a coal-fired steam plant. Compressors operate at 12,000-15,000 psi. There is a by-product coke plant on the plant site.

E. I. du Pont de Nemours & Co. was the wartime operator but Heyden Chemical Co. is now operating it for the Army fertilizer program. This plant was never declared surplus by the Army and no plans were made by War Assets Administration for its disposal.

OHIO RIVER ORDNANCE

Ohio River Ordnance was designed for 150 tons of ammonia a day, but produced 69,000 tons in 1944, equivalent to 190 tons a day. Hydrogen for synthesis is prepared from coke, compressors are operated by steam, and fuel is from coal. Compressors operate at 3,000-4,000 psi.

The plant was operated by Solvay Process Division of Allied Chemical and Dye Corp. It began producing in September, 1942, and operated until August, 1945, when it was shut down due to decreased ammonia requirements for explosives production. Ohio River Ordnance was declared surplus November, 1945, but was withdrawn later and placed in operation by Solvay Process Co. for the Army fertilizer program.

TENNESSEE VALLEY AUTHORITY

TVA's works was designed for production of 150 tons a day of anhydrous ammonia and during 1944 produced approximately 66,000 tons. Hydrogen for synthesis gas is prepared from coke; compressors and auxiliary equipment are steam and electric driven; fuel is from coal. Ammonia production began in the fall of 1942 and ammonium nitrate for fertilizer use, in November, 1943. The TVA plant was never declared surplus and is currently being operated for ammonia and fertilizer nitrate.

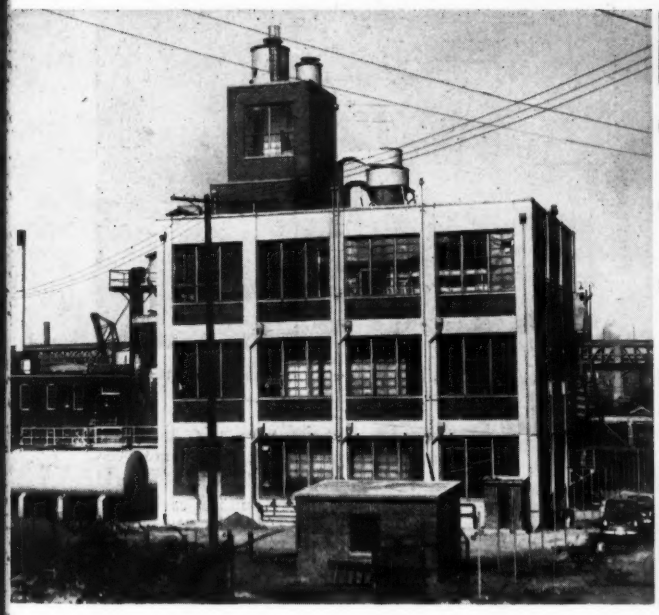
In 1918 two atmospheric nitrogen fixation plants were built at Muscle Shoals, using the best information available at that time, but these plants had not been entirely completed at the end of World War I. One or more units of each plant, however, were completely finished and then given a trial run to determine if they actually could make ammonia, although it had been determined that the cyanamide process could not compete with other sources of fixed nitrogen.

Plant #1 was designed to produce 30 tons a day of ammonia based on the Haber-Bosch process as developed in Germany, and was to include a plant to oxidize this ammonia to nitric acid. Plant #2 was engineered to manufacture calcium cyanamide; process cyanamide to ammonia; oxidize ammonia to nitric acid; and finally manufacture ammonium nitrate from nitric acid and ammonia. The ammonia capacity was 200 tons a day. Raw materials used were lime and coke. (Limestone was available from a nearby quarrry, and coke was shipped in from the Birmingham, Ala., area.) Electric power requirements were to be supplied by the Muscle Shoals dam. This plant was well maintained for many years although three of the twelve furnaces for the manufacture of carbide were diverted to production of phosphoric acid from prosphate rock.

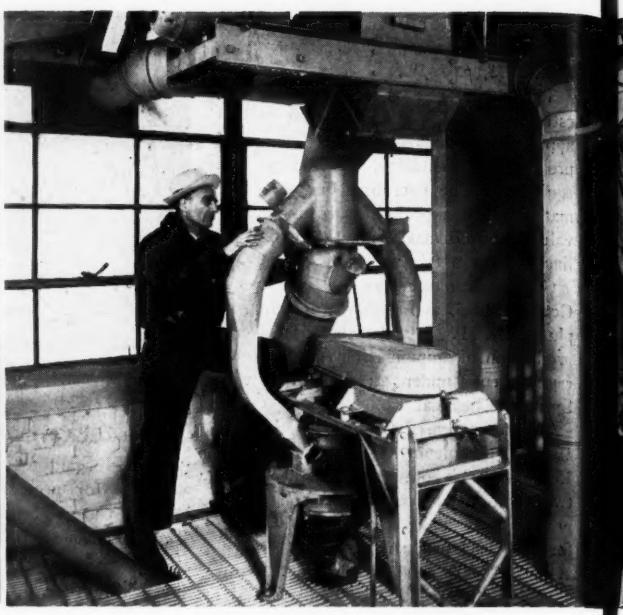
After about 20 years stand-by, a new synthetic ammonia plant was erected on the site in 1942 and other facilities were provided to produce nitric acid and ammonium nitrate, the latter by the then well-known graining kettle method. This method of graining has been continued to the present time, but it is reported that a change is contemplated from kettle graining to the Oslo-Krystal method.

Chemists and engineers of the TVA have recently developed improvements on an Oslo-Krystal unit, leading to better operation and superior ammonium nitrate crystals. This production method is said to be practically free of explosive hazard and is considered by some as an improvement on the "prilling" method.

Part II of this article, covering the end use pattern and the cost of production, will appear in our July issue.—Editor.



1 Sherwin-Williams' solvent extraction plant at Cleveland, O., embodying new process.



2 Dark-colored cortex is stripped off seeds as they strike hard plate at high speed.

Now Castor Oil by SOLVENT EXTRACTION

EDITORIAL STAFF REPORT

SOLVENT EXTRACTION OF SOYBEAN OIL has become common practice; but other seeds and beans—including castor beans—have presented mechanical difficulties. A new process, developed by The Sherwin-Williams Co. with the cooperation of Blaw-Knox Co., uses centrifuges to solve the problem.

A NUMBER of systems for the extraction of oils from seeds, beans and nuts by means of suitable solvents has been described in the literature. In actual practice, however, solvent extraction methods have been confined almost exclusively to recovering oil from soy beans.

Extension of solvent extraction methods to other seeds and beans has been retarded largely because of the "fines" problem. This problem relates directly to the seed composition and structure. With soy beans, the composition and physical structure of the beans permit the formation of uniform, thin flakes that are easily penetrated by the solvent and are capable of retaining their integrity during mechanical handling in the extractors in the presence of solvent. The quantity of fine particles formed during the processing of soy bean flakes is usually not excessive and such fines can be removed from the miscella (mixture of solvent and oil from extractor) by filtration without undue oil losses.

Although some other vegetable seeds may be flaked, the flakes lack the necessary strength to withstand mechanical handling and the action of solvent. Thus, upon attempting to process these flakes in conventional extraction equipment, considerable break-down to fines occurs. In some cases, as with castor beans, the entire bean structure breaks down into a buttery mass.

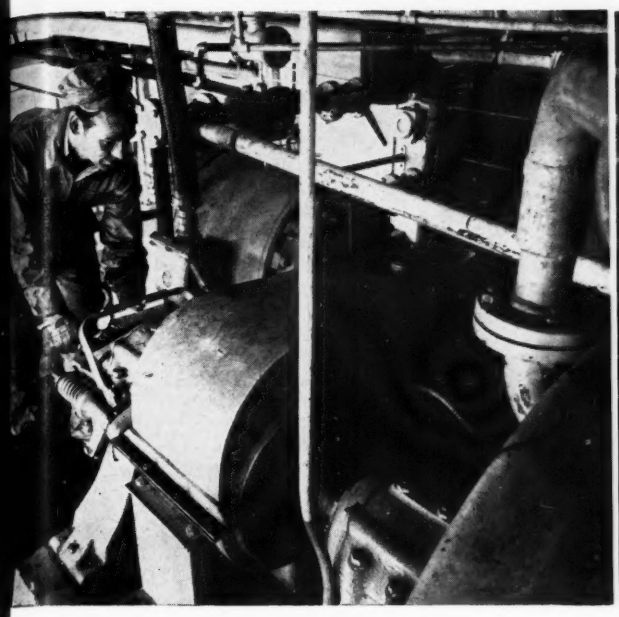
"FINES" REDUCE OIL YIELD

The presence of any considerable quantity of fines in the final miscella is objectionable for two principal reasons: (1) the fines still remaining with the miscella are not only dfficult to remove but also retain oil which represents an appreciable oil loss; (2) if they are not completely removed from the miscella before distillation they will clog the evaporator and condenser tubes, necessitating shut-down of the entire plant for cleaning.

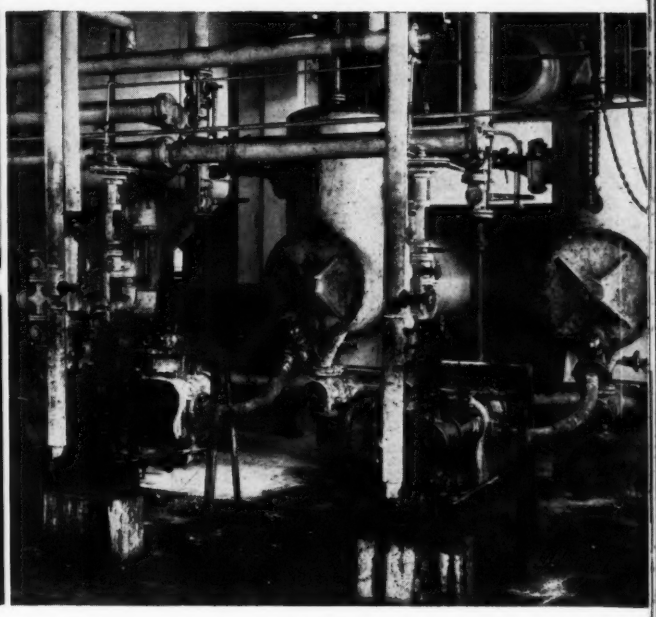
In the basket-type extraction units, where the solvent and miscella must percolate through a mass of solids, fines will diminish the porosity of the seed mass, seriously curtailing percolation. Consequently, complete extraction does not take place and a high loss of oil in the exiting solids results. In the total immersion-type extractor, fines will not settle with the major portion of the solids in the extraction chambers, but are elutriated out along with the miscella. As much as ½ to 5 per cent fines has been reported in operating by this method.

Several approaches to the problem have been reported. Most of these have dealt with preventing the formation of fines, and have been primarily directed toward the preparation of the seeds and beans before they enter the extraction system so that the breakdown of the seed structure is reduced to a minimum.

Reduction of the oil content of seeds by mechanical pressing prior to solvent extraction has helped in some cases. Such lowering of the oil content, together with the compacting of the seed solids incident to pressing, may in some cases permit the formation of sufficiently rugged flakes to withstand subsequent solvent processing to some extent. The amount of



3 Stripped seeds are ground in solvent in attrition mill to optimum particle sizes.



4 Domes at front end of slurry mixers contain oats that control flow through system.

fines formed, however, is usually still undesirably high, and oil losses will be correspondingly high. Because of their strong tendency to disintegrate, the very soft-structured seeds, such as castor beans, are most difficult to handle in the prior-art extraction equipment even after forepressing.

S-W OVERCOMES DIFFICULTIES

A new process, developed by The Sherwin-Williams Co. and embodied in a commercial plant with the cooperation of the Blaw-Knox Co., is not limited to the extraction of seeds which can be prepared in such a manner that their physical structure will not break down under the action of solvent. Seeds of high oil content and of soft physical structure such as the castor bean can be extracted by this process. The plant is designed to handle 100 tons per day of castor beans, 70 tons of flaxseed, 50 tons of soya beans, or comparable quantities of other oil-bearing seed.

An important characteristic of this process is the inclusion of continuous, solid-bowl, centrifugal separators in the extraction circuit. Neither flaking nor forepressing of the materials is necessary. The seeds are merely ground, preferably in the presence of a portion of the solvent, for introduction into the extraction system.

In this system the quantity of fines in the final miscella has been so reduced that prohibitive oil losses are not experienced and the clarification of the miscella from these fines is not difficult. In the extraction of soft-structured seeds such as castor beans and flax by the new method, the miscella effluent from the separators contains only from 0.02 to 0.7 per cent fines. This amount, it is found, can be removed easily and completely by disk-type centrifuges.

Flaxseed and some other seeds are advantageously steamed or cooked lightly prior to introduction into the extraction system. Flaxseed is crushed on rolls and then submitted to a light steaming operation from which it is conveyed directly into the mixer of the extraction system. Such pretreatment increases the rate of extraction and improves the handling characteristics.

SEED STORAGE AND HANDLING

The arrangements and requirements for the handling and storage of the seeds and beans are not essentially different from those of prior-art seed processing plants. Since, however, the extraction system is designed to handle a variety of different seed materials, the storage and handling equipment is in turn designed with sufficient flexibility to be adaptable to the various seed characteristics.

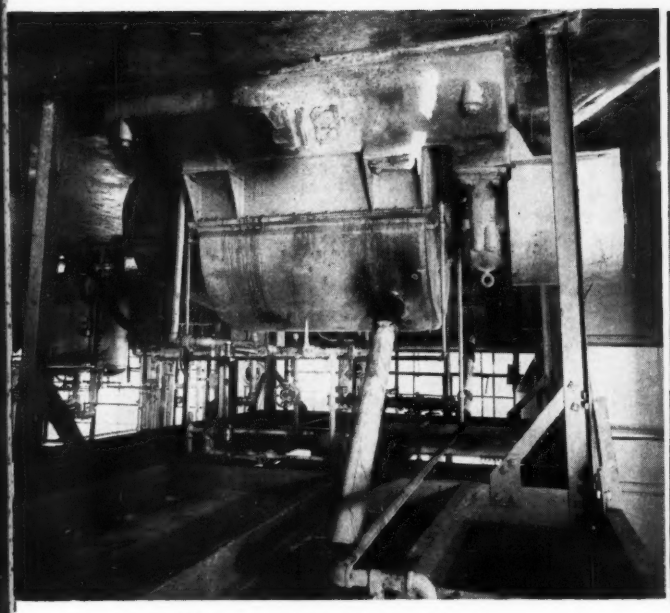
The humidity and temperature conditions during storage are held within limits specific to each seed. Excess of moisture induces heating and spoilage through enzyme activity and bacterial and fungus attack. Too low a humidity on the other hand causes drying out of the seed, with a resulting embrittlement and premature separation of some of the cortex or seed covering. The kernel is thus exposed to oxidation as well as enzyme activity. The oil will be darkened and show increased acidity. Control is especially important with materials such as the castor bean, which is particularly sensitive to such reactions.

Seeds or beans of high oil content must be handled carefully in order to avoid exposing the kernel with resulting seepage of oil. Such seepage causes the formation of sticky masses which are moved with difficulty or may completely gum up the equipment. Special provisions are made in bucket elevators so that no breakage of the seed will occur. Screw conveyors, if not overloaded, have been found suitable for conveying whole castor beans over short distances, and mass flow conveyors will handle the mixture of hulls and meats after decortication. Handling of mixtures of hulls and meats after decortication is kept to a minimum, however, because the oily surface of the beans in intimate contact with the hulls will coat these with oil, thereby providing a source of oil loss since the hulls do not pass through the extraction system.

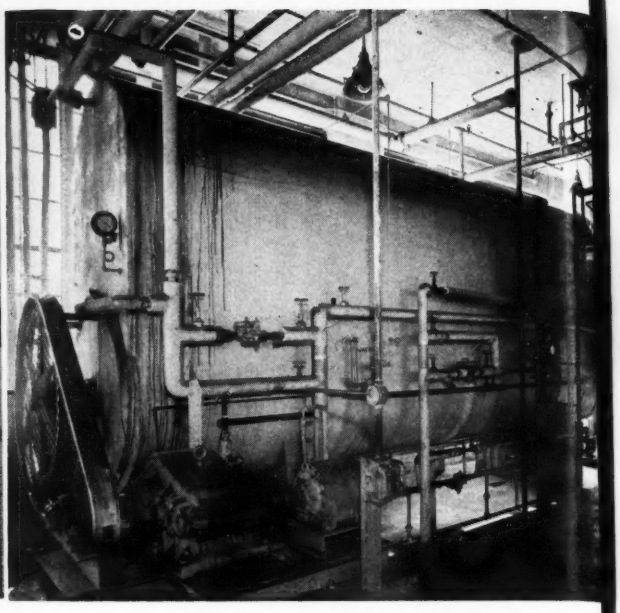
DECORTICATION

Seeds such as castor which are sufficiently large and of a nature to permit decortication prior to extraction of the oil are advantageously submitted to this operation. Besides reducing the bulk of solids in process, decortication results in the production of an oil of higher color value. The proteinaceous residue is comparatively free from the inert, dark-colored cortex and is therefore of increased nutritional and industrial advantage.

Decortication is effected by impingement of the seed upon a hard surface at a high speed of contact. The cortex is thus cracked and separated from the kernel. In order to do this successfully a careful adjustment of moisture content to a critical point specific to each seed mate-



5 Continuous, solid-bowl Bird centrifugal separator separates solids from solvent.



6 Proteinaceous solids from final centrifugation are deodorized and desolventized.

rial is essential. The conventional rotary decorticators are effective. Tests on castor beans indicate that impingement in such a device will pop off the hulls without breaking away the pellicle which covers the meat of the bean. Seepage of oil is thereby prevented or retarded, and tendency toward formation of gummy masses and the adhesion of the cortex to the kernel reduced.

After decortication the cortex particles are separated from the kernels by air elutriation. The kernels go directly by gravity to a surge bin from which they are fed into the grinding and extracting systems at a uniform and controlled rate by means of an Omega rotary vane-type feeder.

GRINDING IN SOLVENT

A principal advantage of grinding the seed solids in the presence of solvent is the early intimate mixing and wetting of the solids by solvent to facilitate extraction. With such materials as castor bean kernels comparatively little actual grind is required since they easily break down in the solvent to a buttery mass. Other seeds may require a more intensive grinding to reduce the harder kernel to the optimum particle size for rapid extraction. The optimum grind or particle size for any specific seed material is determined in the laboratory by immersing samples ground to different degrees in a quantity of the solvent heated to the extraction temperature and calculated to give a 20 per cent miscella with the oil present. The temperature is maintained with gentle agitation for five minutes. An aliquot is then taken and the extracted oil calculated. For efficient plant extraction it is desirable that 95-100 per cent extraction be obtained under the laboratory conditions stated.

The grinding system comprises an attrition mill into which is fed simultaneously with the seed a stream of half-miscella from the "B" centrifugal separator at a rate to maintain a ratio of 1 part of seed to 2 parts of half-miscella. The equipment is regulated to give a break-down of the seed material to a particle size best adapted to rapid extraction.

EXTRACTION

The extraction system consists of three units in series. Each unit comprises a slurry mixer and a continuous, solid-bowl, Bird centrifugal separator. Each unit is capable of extracting approximately 90 per cent of the oil input to that unit when the solvent feed is adjusted to produce a final miscella of 20 per cent oil content. With three units in the system, the input solids to the final unit carry only about 1 per cent of the oil and the output solids from this unit retain only a few tenths of a per cent of the oil. The mixers are specially designed horizontal cylinders 2'5" by 18" in which are mounted rotating shafts carrying a series of screw blades. This design of the mixers effects a forward movement of the solids and miscella preventing back mix and allowing the prescribed amount of time for mixing of the solids and extracting miscella. A concurrent flow of miscella and solids is thus achieved in the mixers, while in the extraction system, taken as a whole, the miscella and solids flow countercurrently.

The output of the grinding system is fed directly to the extraction system by gravity. The feed of seed materials to the extraction system is maintained at a uniform predetermined rate. The desired ratio of seed materials to solvent is maintained in the overall extraction system by regulating the fresh solvent input to the system to balance the seed input.

The slurry pumps from each of the mixers are controlled by floats placed in domes located at the front end of each mixer. These controls, plus a Foxboro flow control set at approximately 30 gal./min. on the entering fresh solvent stream, govern the flow of slurries and miscellas throughout the extraction system. Fresh solvent entering the extraction system is heated by steam heat-exchangers to about 170° F. The first mixer, where solids enter the system, is steam-jacketed so that the proper operating temperature can be maintained. The final miscella from the first unit is practically clear and free from fines. As a safety precaution, however, it is first run through a clarifier and the solvent and oil are then separated.

SOLVENT PROPERTIES

The boiling point of the solvent must be low enough so that the solvent can be stripped from the oil and meal without resorting to excessive temperature which would affect the color or other qualities of the products. A solvent with too low a boiling point tends to increase mechanical solvent losses, as well as reduce extraction rate by limiting the operable temperature.

In general those solvents which have the highest rate of extraction of oil (have

the greatest affinity for oil) will, for this reason, be the most difficult to remove from the solvent oil mixture in the distillation system. The solvent must not extract undesirable constituents such as coloring material, from the seeds. Any solvent that tends to hold water in solution is not desirable because water will accumulate in the system and because steam stripping of the solvent from the oil would be impractical.

For these reasons hexane and heptane have been adopted in this plant as preferred extracting agents. Hexane is used as the extracting agent with flaxseed but is not used for castor because its boiling point is so close to the efficient extraction temperature. The optimum extracting temperature for castor is higher than for —e.g.—flaxseed, since castor is immiscible with hydrocarbon solvents at temperatures in the range of 30 to 40 degrees centigrade.

RECOVERY OF SOLIDS

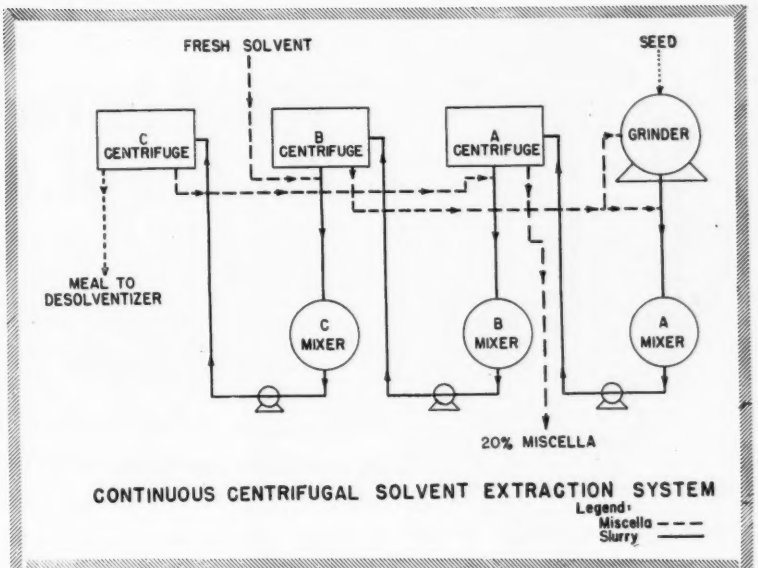
The proteinaceous solids recovered from the last unit are freed from solvent by heating in a combination desolventizer and deodorizer, and the solvents recovered from this equipment and from the final miscella are combined and returned to the process. Conditions may be controlled to obtain a meal which ranges in form from a flour to a pelleted state as desired.

The plant is protected by adequate sealing against vapor leaks and is housed in carefully ventilated buildings providing for rapid removal of any chance vapors. Provision is made that, should failure occur in either the air or instrumental process control system, all flows are automatically stopped.

Electrical equipment is all of an approved explosion-proof type. The extraction system possesses an inherent safety factor against explosion in that the equipment is designed to run full, thereby avoiding spaces in which vapors might collect. A low circulating volume of solvent also contributes to the safety of the system.

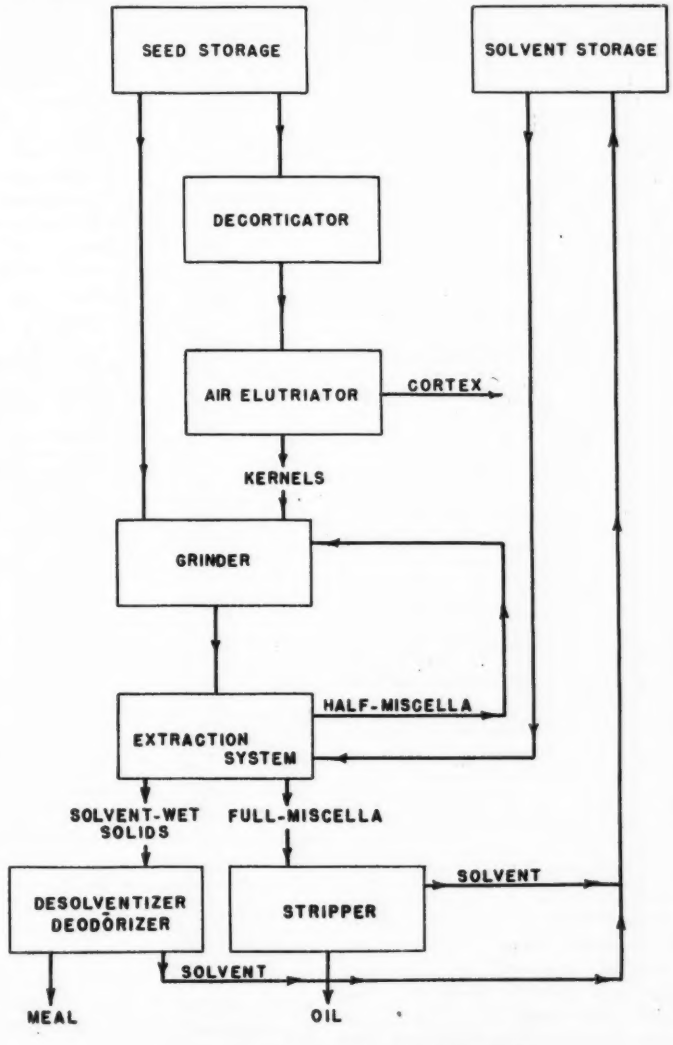
With the development of this type of solvent extraction system, it is now possible to enjoy the benefits of solvent extraction for the many oil-containing seeds having a soft physical structure and not hitherto economically amenable to the solvent methods. When converting the system to processing different seeds, the only equipment changes required are those dictated by the problem of handling the seeds up to the point where they are fed to the grinder.

Various features of this new system and process are the subject of a number of pending United States and foreign patent applications. Broad process claims have been allowed in the United States, and patents have already been granted in several foreign countries.

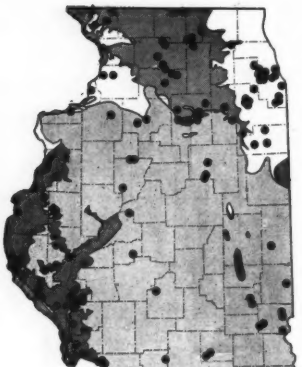


CONTINUOUS CENTRIFUGAL SOLVENT EXTRACTION SYSTEM

Legend:
Miscella - - -
Slurry ——



PLANT FLOW SHEET



Where to Find Information On Mineral Raw Materials

by M. M. LEIGHTON, Chief,
State Geological Survey, Urbana, Ill.

MINERALS ARE OFTEN IMPORTANT RAW MATERIALS for chemical operations, but the chemical market research man is not usually conversant with the field. Many information sources are available to help him find the field. Here an expert tells him where to find the facts he needs.

THE problem of surveying the mineral raw material supply by the chemical market researcher may be simple or difficult, depending on what the mineral raw materials are, what use is to be made of them, in what quantity they are desired, whether or not they are to be obtained on the open market or are to be produced from deposits, and how familiar the researcher is with the mineral field and the sources of information.

MINERAL SPECIFICATIONS

The first thing to be done is to compile carefully and critically the specifications of composition, properties, and amounts of the mineral or minerals that will be required. Minerals in the natural deposits are almost invariably impure, or have a range in composition, or are intimately mixed with other minerals. Tolerance in composition and properties should, of course, be determined. The mineral variety may be important.

Therefore, it may be necessary, after having determined the composition and properties of the mineral substance, to consult reference books such as Dana's "System of Mineralogy", Dana's "Manual of Mineralogy", or "Industrial Minerals and Rocks", or other similar volumes (see list of reference books appended to this article); then turn to sources of information on resources.

INFORMATION SOURCES

The geology and mineral resources of the United States have been subjects of study for many decades but because of their hidden occurrence and the vastness of the field, there is much yet to be learned. We shall now consider the sources of published information in economic geology and mining and also sources of information not yet published.

The most prolific sources of such information are the U. S. Geological Survey, the U. S. Bureau of Mines, and the many state geological surveys and mining bureaus. (A list of these with their addresses is herewith appended.) The information of the federal and state surveys and bureaus supplement each other and neither should be neglected. Lindgren's "Mineral Deposits", Bateman's "Economic Mineral Deposits", Ries' "Economic Geology", Emmon's "Principles of Economic Geology", McKinstry's "Mining Geology", "Minerals Yearbook" published annually by the U. S. Bureau of Mines, "Mineral Industry" published annually by McGraw-Hill, "Industrial Minerals and Rocks" published by the A.I.M.M.E., "The Stone Industries" by Oliver Bowles, "Materials Handbook" by Brady, and "Mineral Resources of the United States" published by Public Affairs Press are among the useful reference books that may be named.

The publication lists of the federal and state geological surveys and mining bureaus are desirable to have at hand. In addition, one should have access to the "Annotated Bibliographies of North American Geology", published by the U. S. Geological Survey, the "Bibliography and Index of Foreign Geology" published by the Geological Society of America, the "Annotated Bibliography of Economic Geology" published by the Economic Geology Publishing Co., the "Engineering Index", "Chemical Abstracts", and others in this field.

Other sources of information and assistance are the specialists and consultants in geology and mining at universities and in private practice.

Most of the state surveys can furnish lists of mineral producers, together with information about products. Information of a highly specialized order concerning geochemistry and geophysics is procurable from certain laboratories like those of the U. S. Geological Survey, U. S. Bureau of Standards, Penna. State College School of Mineral Industries, the Ill. Geological Survey, and certain other industrial institutes and universities.

MARKET RANGE

Some mineral commodities have a narrow geographic market range: agricultural limestone, crushed rock, most structural clay products, certain coals, rock wool, etc.

Other mineral commodities have market areas of much wider range: coking coals, petroleum and natural gas, marbles, granite, slate, Indiana limestone, kaolin, bentonite, refractory brick, lightweight refractory brick, cement (in some cases), salt, bromine and other mineral salts, magnesite, fertilizers, abrasives, asbestos, fluorspar, feldspar, fuller's earth, glass products, graphite, monazite, mica, pigments, and other minor mineral products, mineral waters, metallic ores, alloying minerals, etc.

Information concerning the former group is obtainable from the State Geological Surveys. Information about the latter requires sources that are both state and national, and in some cases international.

Minerals which are not to be found in commercial quantities in this country are summarized in "Mineral Resources of the United States".

INFORMATION AVAILABLE

It may be helpful to cite some specific examples of the nature of the information available. Examples are drawn, because of familiarity, from the work of the Ill. Geological Survey.

Presented before the meeting of the Chemical Market Research Association, St. Louis, Missouri, April 4-5, 1949.

The illustration, depicting the State of Illinois, shows the locations of plants producing raw mineral materials for the chemical, metallurgical, and processing industries. These include high-purity dolomites, high-calcium limestones, special type of clays, molding sands and bonding materials, fluorspar, abrasives, etc. The Ill. Geological Survey has a great deal of information on the composition, physical and chemical properties of these materials, their availability, and in some cases information on deposits that are not yet developed. The Survey maintains specialists in geology, physics, chemistry, and mineral economics.

A large amount of information is available from the Ill. Geological Survey on many kinds of rock and rock products and clay and ceramic products; and also on the many occurrences of oil and gas in the State, including the composition and physical properties of the crude oil. In addition, the Survey possesses much information on the brines found in many of these pools and in other drilling; and on the various coal deposits and their use as chemical raw material.

NEW TECHNOLOGIC USES

New technologic uses may be found in "Minerals Yearbook", "Mineral Industry", chemical publications and engineering journals. "Annotated Bibliographies" and the "Engineering Index" should be scanned.

Matters of mine, pit, or quarry development to supply the needs of a large company should, in due time, receive the attention of the company's engineers and consulting engineers.

The complexity of the mineral commodity field and the specialization in its various phases make it essential that the chemical market research worker who is interested in these commodities maintain a shelf of ready reference books and develop an acquaintance with the numerous sources of information that exist throughout this country. The information of the U. S. Geological Survey and the U. S. Bureau of Mines on foreign sources have been greatly amplified recently by foreign studies and by consideration of international mineral economics.

Specialized mineral economists in this country are comparatively few but they do exist in some state and federal organizations, in a few universities, and in specialized fields of industry.

The Economic Geology Publishing Co., a non-profit organization of research economic geologists set up to publish the "Journal of Economic Geology" (founded in 1905) is also prepared to cite sources of information. Inquiries to it may be sent to 100 Natural Resources Building, Urbana, Ill.

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Bureau of Foreign and Domestic Commerce, Amos E. Taylor, Director

National Bureau of Standards, E. U. Condon, Director

Patent Office, Casper W. Ooms, Commissioner of Patents

Department of the Interior

Bureau of Mines, James Boyd, Director

Geological Survey, William E. Wrather, Director

Oil and Gas Division, Max W. Ball, Director

State Geological Surveys

Alabama, Geological Survey of Alabama, University

Arizona, Arizona Bureau of Mines, Tucson

Arkansas, Office of State Geologist, Little Rock

California, State Division of Mines, Department of Natural Resources, Ferry Building, San Francisco 11

Colorado, Colorado Geological Survey Board, Golden

Connecticut, Connecticut Geological Survey, Trinity College, Hartford 6

Delaware, no geological survey

Florida, Florida Geological Survey, Drawer 631, Tallahassee

Georgia, Department of Mines, Mining and Geology, Atlanta

Idaho, State Bureau of Mines and Geology, Moscow

Illinois, State Geological Survey Division, Department of Registration and Education, Urbana

Indiana, Division of Geology, Dept. of Conservation, Bloomington

Iowa, Iowa Geological Survey, Iowa City

Kansas, State Geological Survey of Kansas, Lawrence

Kansas, State Geological Survey of Kansas, Lawrence

Kentucky, Kentucky Geological Survey, Rm. No. 5, Miller Hall, University of Kentucky, Lexington

Louisiana, Louisiana Geological Survey, Louisiana State University, Baton Rouge 3

Maine, State Geological Survey, Orono

Maryland, Department of Geology, Mines and Water Resources, Baltimore 18

Massachusetts, no geological survey

Michigan, Geological Survey Division, Department of Conservation, Lansing

Minnesota, Minnesota Geological Survey, Minneapolis 14

Mississippi, Mississippi Geological Survey, University

Missouri, Missouri Geological Survey and Water Resources, Rolla

Montana, State Bureau of Mines and Geology, Butte

Nebraska, Conservation & Survey Div., University of Nebraska, Lincoln

Nevada, Nevada State Bureau of Mines, Reno

New Hampshire, Mineral Resources Committee, New Hampshire State Planning and Development Committee, Durham

New Jersey, Division of Geology and Topography, Department of Conservation and Development, Trenton

New Mexico, New Mexnco Bureau of Mines and Mineral Resources, Socorro

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North Carolina, North Carolina Department of Conservation and Development, Raleigh

North Dakota, North Dakota Geological Survey, Grand Forks

Ohio, Geological Survey of Ohio, Columbus 10

Oklahoma, Oklahoma Geological Survey, Norman

Oregon, State Department of Geology and Mineral Industries, 702 Woodlark Building, Portland 5

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Rhode Island, Mineral Resources Committee, Rhode Island Industrial Commission, Providence

South Carolina, South Carolina Geological Survey, Columbia 19

South Dakota, State Geological Survey, Vermillion

Tennessee, Division of Geology, Nashville 3

Texas, Bureau of Economic Geology, University of Texas, Austin

Utah, Utah Geol. & Mineralogical Survey, Utah State Dept. of Publicity & Indus. Dev., Salt Lake City

Vermont, Vermont Geological Survey, Burlington

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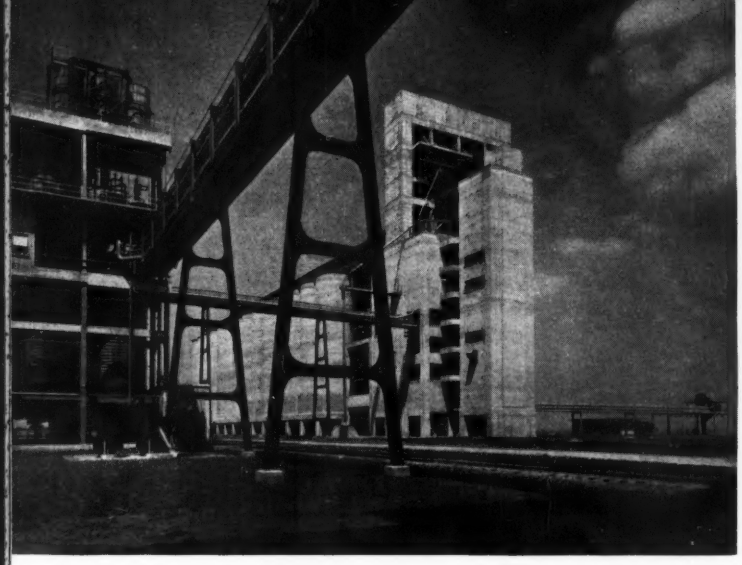
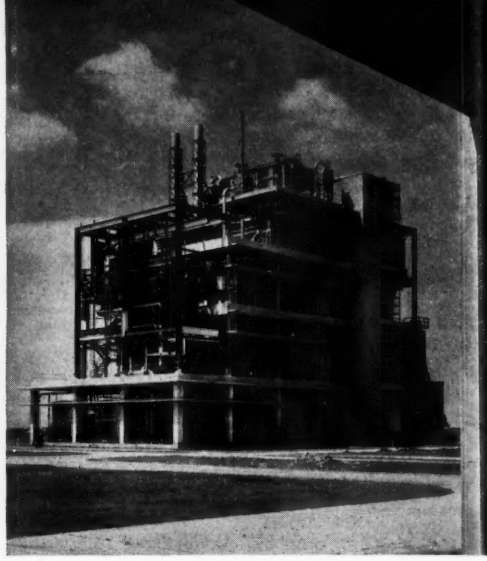
Washington, Division of Mines and Geology, Department of Conservation and Development, Olympia

West Virginia, West Virginia Geological and Economic Survey, Morgantown

Wisconsin, Wisconsin Geological and Natural History Survey, Madison 6

Wyoming, Geological Survey of Wyoming, Laramie





The new milo starch plant is located on a bluff overlooking Nueces Bay near Corpus Christi, Texas. At the left are the 2-million-bushel grain storage silos and the grain steeping building. Right, the building housing weighing and packing equipment for starch and dextrose.

Continuous methods and automatic control feature first plant for making . . .

STARCH and SUGAR from MILO MAIZE

by ROBERT L. TAYLOR, Editor

WHEN starch producers had trouble getting corn during the war they turned to other starch-bearing "substitutes." One of these was milo maize, a hardy, drought-resistant grain sorghum that thrived in the semi-arid plains country of Texas, Oklahoma, Kansas, Colorado and New Mexico. It was used in these areas as green fodder for livestock.

Agricultural chemists had learned long before that the tiny, popcorn-like seeds of the milo plant had about the same chemical composition as corn. But the similarity ended there. Encased in a hard outer skin, the kernels would not soften in the steeping vats as readily as corn. They carried a small pointed husk, called the glume, which if not completely removed would discolor some of the final products. And they introduced other processing difficulties not encountered with corn. All considered, milo was not exactly welcomed into the starch industry with open arms.

But that was six or seven years ago. Starch makers have since learned how to handle milo and how to process it. And while all of the curses may not yet have turned to praises, milo has found what appears to be a permanent place in the starch industry. With the completion this spring of Corn Products Refining Company's Bluebonnet (after the Texas state flower) plant at Corpus Christi, Tex., it becomes the raw material for a potential production of 50,000 tons of starch and 50,000 tons of dextrose sugar per year.

The Bluebonnet plant is noteworthy for several reasons: It is the first starch plant specifically designed to operate on grain sorghum. It is the first starch plant to employ continuous and fully automatic operation. In the opinion of many it reaches a new high in architectural treatment for a process industries plant, with respect to both functionality and eye appeal. And these accomplishments are made no less impressive by the fact that it is the first new starch from grain plant to be built in the U. S. in 27 years!

WHY MILO?

There were a number of factors that figured in Corn Products' decision to build at Corpus Christi and use milo instead of corn.

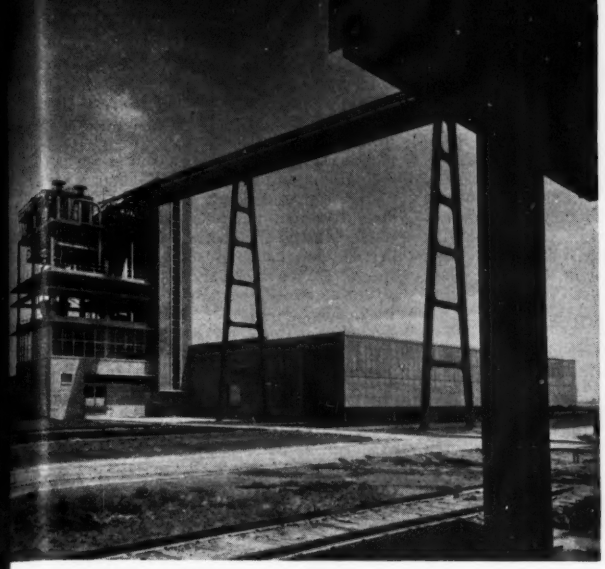
An important one at the time was what looked like a good export market for starches. Location on the Gulf Coast provides easy access by water to the world's major starch-consuming centers. It likewise offers convenience to U. S. West Coast markets for dextrose sugar. At the moment, unfortunately, the European dollar shortage is playing hob with the original export forecasts so that the starch market is not as great as anticipated, but there has been no change in the company's plans for dextrose shipments.

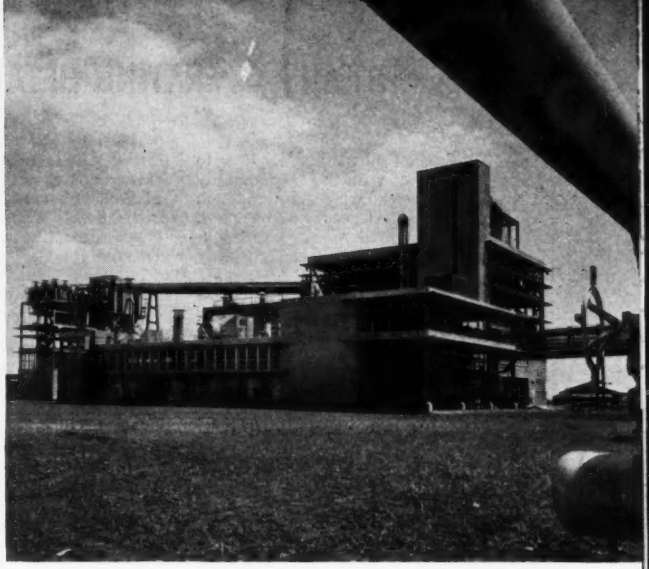
Other important favorable aspects of the Texas location are availability of cheap natural gas for fuel and power, more advantageous labor rates, and the opportunity for open construction of plant buildings. To some extent, these are offset by the higher cost of fresh process water, a problem which now besets virtually the entire Gulf Coast area.

Without its wartime experience with milo maize, Corn Products, of course, could not have made use of these advantages, for nowhere did they co-exist along with an economical supply of corn. Milo, on the other hand, grows abundantly in eastern Texas. Some 17,000,000 bu. are grown annually within a 50-mile radius of Corpus Christi, which is almost three times the Bluebonnet plant's capacity requirement of 6,000,000 bu. per year.

THE ECONOMICS

We have mentioned that grain sorghum and corn are roughly comparable in starch content. On recoverable oils, however,





In the feed house, shown at left, the hulls, fiber and gluten are dried and blended to make high-protein stock feeds. The starch goes either to the starch house, right, where it is washed and dried, or to the dextrose refinery where it is hydrolyzed in a continuous converter.

sorghums contain only about 1½-2% as compared with 3½% for corn. For this reason, when the two are considered competitively for starch making, it is necessary that sorghum, even in Texas, be available at a lower price than corn in order to show an advantage. How much lower depends on the market price of corn oil, which, to complicate the matter further, is determined by the price of cottonseed oil rather than corn. The economics of starch and dextrose from milo are thus rather involved.

Eventually the Bluebonnet plant may recover some milo byproducts, the most important of which is a wax similar to Carnauba, which should help the overall economics of milo, but this will be sometime in the future. Meanwhile the plant expects to make a profit on straight starch, dextrose and oil.

BEAUTY WITH A PURPOSE

Architecturally the Corpus Christi plant embodies several innovations and departures from past practice that have already earned it some notoriety among chemical processing plants. The design, handled by the H. K. Ferguson Co., of Cleveland, O., was established at the outset to conform with an objective of complete functionality combined with pleasing appearance. The result is an effect found all too rarely in the process industries.

The 135-acre plant site is ideally located on a low bluff overlooking Nueces Bay. Layout of the 19 major buildings has been planned around the large two million bushel grain storage unit, the power plant and the administration area.

The storage building is situated close to the bay, where it can receive both rail and truck deliveries and at the same time be in a position to make use of future boat docking facilities. The power plant, in order to serve all production buildings economically with low pressure process steam, is located centrally, as are the administration building and control laboratory. A time office and service building is located near the plant entrance. Other buildings are placed at spacious intervals to allow for future expansion up to triple the present capacity while projected landscaping plans remind one more of a college campus than an industrial plant.

The basic architectural plan of the buildings is one of open construction around an enclosed brickwork tower. The tower provides housing for facilities such as elevator, operators' desk stations and toilets, and at the same time affords fire protection and shelter at all operating levels. Processing equipment is located on open floors projecting from the enclosed towers. This arrangement, with the liberal use of concrete sun canopies projecting beyond the supporting columns of each floor, gives a pleasing cantilever appearance to the buildings.

In addition to economy in both construction and maintenance of buildings, the open construction permits maximum benefit from the year-round mild climate as well as greater freedom from fumes, odors and fire. It also makes for greater flexibility for alterations and expansion. To make open construction possible, however, it was necessary to totally enclose the process itself. This has been done in all except the packaging and sugar-spinning operations, which are carried out in enclosed areas.

A further architectural feature that adds to both appearance and practicality of the plant is the use of aluminum window sash and handrails. As a sanitary measure and to guard against rodents and bugs, the plant contains no pits or subsurface operations with the exception of pipe tunnels. All processing equipment is above ground. Steam, process and electrical lines between buildings are underground except for two bridges. The plant uses a large amount of nickel, copper, bronze and vitreous-lined pipe, and stainless steel and stainless-lined equipment is much in evidence in many of the process buildings.

It is interesting that for the instrumentation and automatic control features of the plant Corn Products imported engineering talent from the petroleum industry, which has long been noted for its leadership in this phase of process engineering. The result is pushbutton control virtually throughout—a far cry from the antiquated batch methods that have characterized the starch industry in the past. For example, the grind rate of the grain and the amount of water entering the system are closely controlled by automatic devices in order to maintain constant concentrations of slurries throughout the process. This is necessary in order to achieve the proper functioning of the automatic materials-handling equipment which makes continuous operation possible.

Fresh water requirements of the plant are 1,400,000 gals. per day make-up on about 30,000,000 gals. per day total circulation, all of which is purchased from the city of Corpus Christi.

Power plant facilities consist of one boiler capable of producing 250,000 lbs. of steam per hour and one 7,500 kw. turbine. Process steam at 150 lbs. pressure is extracted from the first stage of the turbine, and the exhaust at 10 lbs. is used for the evaporators.

Total employment at the plant will be about 250 people for three-shift operation, of which about 50 will be supervisory.

For readers interested in process details, a description of engineering and operating features of the plant is given on the following pages.

ENGINEERING AND OPERATING DETAILS

The Bluebonnet plant is designed to operate on any one of the large family of grain sorghums, which includes—in addition to milo—durra, feterita, hog millet and kafir. Milo, however, is expected to be the grain most frequently processed.

The milo is received by truck and boxcar, and provisions have been made for possible barge unloading in the future. At the truck station the grain is dumped into a concrete pit from which it is raised by bucket elevator and then moved horizontally by covered belt conveyor to the storage building. Truck-unloading facilities are capable of handling 75,000 bu. per day. Boxcar unloading is done by flexible airveyors, which can handle up to 50,000 bu. per day.

In the storage building the grain is weighed, cleaned, dried and scoured, the latter to remove a pointed husk, called the glume. If allowed to remain, the glume would discolor the valuable oil that is pressed out later in the process.

To separate the germ and bran from the starch, the plant uses a variation of the wet-milling process ordinarily employed on corn. From the concrete storage silos (capacity 2,000,000 bu.) the grain moves on a 30-in. overhead, covered conveyor to wooden steeping vats in the first processing building. There it is steeped in dilute sulfurous acid for about 60 hours to loosen the germ and break up the protein matrix around the starch. This compares with about a 48 hour steep required for corn. The steep house is provided with a small rotary sulfur burner to provide sulfur dioxide for making the acid and for sterilizing. Steeping is one of only two operations in the entire plant that are not continuous.

MILL HOUSE

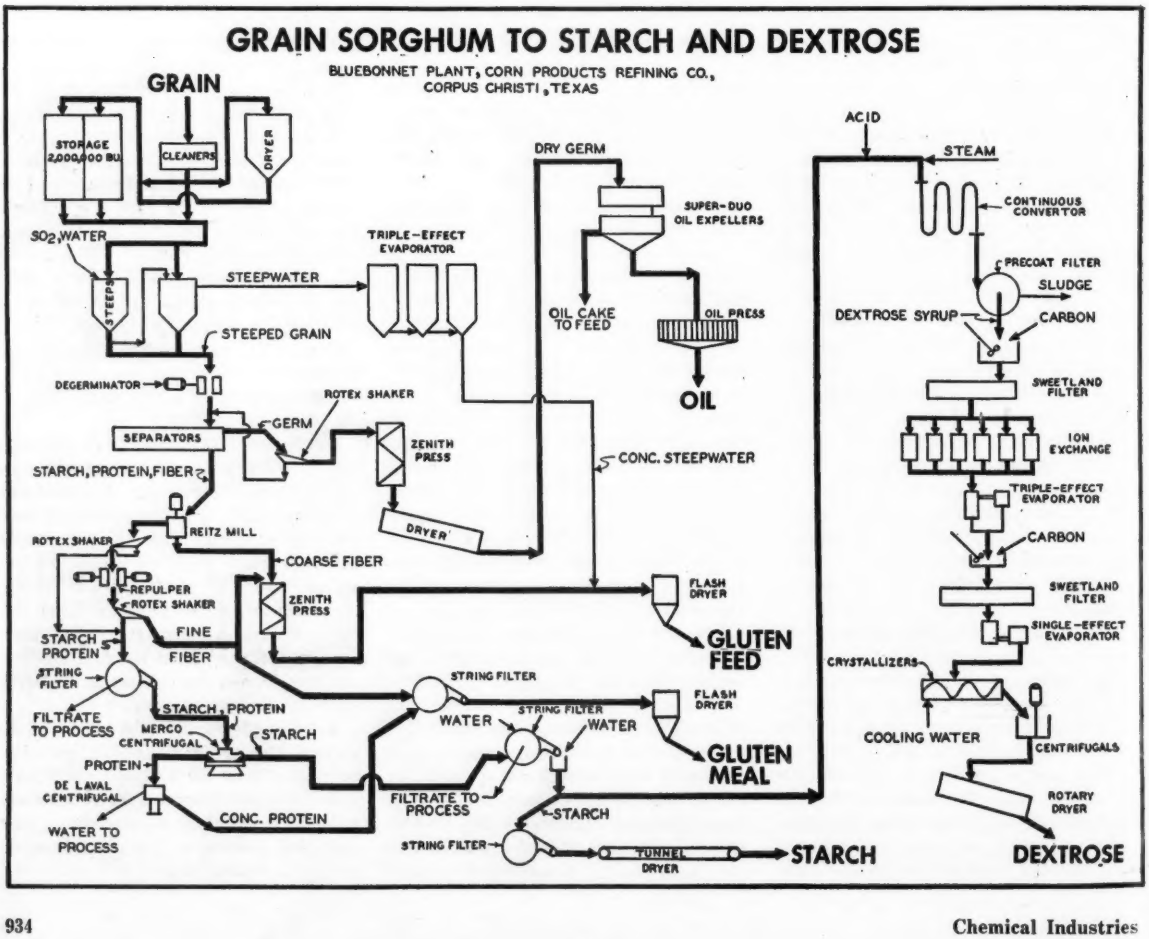
Pumping of the steeped grain to the mill house in the form of a slurry is a new wrinkle at the Bluebonnet plant. Previously this has always been done by screw conveyors or drags. In the mill house the grain makes two passes through degerminators which tear the germ loose from the rest of the kernel. Germ separators then float off the germ, leaving the fiber, starch and protein in the underflow.

Next the germ is washed free of starch on Rotex washing shakers and dried in a steam rotary dryer. Oil is expressed from the dried germ by three Anderson Super-Duo pressure expellers. It is collected and sold in drums or tank cars, while the cake is sent to the feed house for combining with gluten and fiber to make stock feed.

Returning to the germ separators, the underflow of fiber, starch and protein goes to a battery of three Reitz disintegrators. The Reitz is a machine that is new to the milling industry. It has been used principally in the preparation of food purees. In the starch process its function is to separate the hull (coarse fiber) from the endosperm (a combination of fine fiber, starch and protein). It works by forcing the feed, by means of revolving hammers, around the inside of a vertical cylindrical screen so that the fine, softer material goes through the screen and the coarse matter passes out the bottom of the cylinder. To achieve the separation desired in the milo maize operation a special screen assembly was developed.

The coarse fiber from the Reitz is washed and transported to the feed house. The fine material is passed over Rotex silk screen shakers, where the free starch and protein are separated from the "grits," or hard particles, of combined starch and protein. The grits are then ground to a fine consistency in Sprout-Waldron re-pulpers and passed over Rotex shakers again which separate the free starch and protein from the remaining fine fibers. The re-pulpers are double revolving-plate attrition mills. After working out a modified plate design, it was found that two mills using 36-in. dia. plates could handle the full plant load. In the Bluebonnet plant the three Reitz machines and two re-pulpers together do a job that formerly required buhr mills, moisture expellers, and a three-stage coarse fiber washing station to get the same results.

The fine fibers from the shakers following the re-pulpers are washed, filtered and sent to the feed house. Zenith presses have replaced plate and frame presses and old type moisture expellers for dewatering fine and coarse fibers and germ.



Starch and protein from the re-pulpers are combined with that from the Reitz disintegrators and separated in a battery of six 30-in. Merco centrifugals. The Mercos are operated in two stages, with three machines in each stage. The first stage produces (1) a high-protein gluten which is concentrated in DeLaval centrifugals and then sent to the feed house where it is combined with fiber, dewatered on a string filter, and dried in a Raymond flash dryer; and (2) a low-grade starch which is sent to the second stage Mercos. These second-stage machines are set to give a high-grade starch, which is washed, filtered and dried, and a low-grade gluten, which is concentrated in another series of De Laval centrifugals and recirculated to the first-stage machines.

The Mercos are being operated at about 2,550 rpm. Control is completely automatic. Instrument compensation has been provided for variations in feed rate and, through automatic Baumé controllers on feed lines, feed composition. Wash water rate and draw-off rates are automatically adjusted to variations in feed rate and composition in order to maintain constant composition of product. It is believed that this is the first time this rather delicately balanced operation has been controlled entirely by automatic means.

The DeLaval centrifugals used for gluten concentration were especially designed for this purpose and achieve the separation of water in a matter of seconds as compared with hours required in the settlers formerly used. The machines are a modification of the starch stripping model. Higher speeds and greater disk area are involved.

The good starch from the second-stage Mercos is washed on two Eimco drum filters in series and then pumped either to the starch finishing department or to the dextrose refinery. In starch finishing the starch is washed again on Feinc (Filtration Engineers, Inc.) string filters and passed through Proctor & Schwartz steam-heated belt dryers, each of which is capable of taking 175,000 lbs. per day of starch down to 12% moisture.

After screening, the starch is packaged in 100-lb. paper bags.

FEED HOUSE

In the feed house, or by-products department, the water in which the grain has been steeped is concentrated in a triple-effect, vertical tube vacuum evaporator, mixed with fine and coarse fiber and a required amount of gluten, and dried in a gas-fired Raymond flash dryer. The dried material is packed in bags and marketed as cattle feed.

The remaining gluten is combined with a required amount of fiber to meet the protein specifications for gluten meal. This is also flash dried, screened, packed in 100-lb. bags and sold to mixers for stock and poultry feeds.

The two flash-drying installations mentioned here represent the first commercial-scale application of this type of drying to gluten. Previous methods used steam tube or direct fire dryers. Flash drying is said to give a finer and more uniform product of lighter color.

SUGAR HOUSE

In the dextrose refinery, starch is converted to dextrose by acid hydrolysis for the first time in large-scale continuous equipment. A pilot plant prototype of the continuous converter was described in some detail in a paper by J. E. Dlouhy and A. Kott, of Corn Products, before the annual meeting of the American Institute of Chemical Engineers in Nov. 1947.

Briefly the converter, of which there are two in the Corpus Christi plant, consists of 550 ft. of 8-in. copper tubing arranged in a coil with vertical loops to conserve space. This is preceded by a starch make-up tank in which the starch slurry is introduced continuously along with dilution water and a metered quantity of concentrated sulfuric acid. The comparatively weak acidity (0.03 N) avoids formation of by-products through side reactions. The adjusted slurry is pumped to a heater just ahead of the coil entry chamber, where live steam is injected to bring the system to an operating temperature and pressure corresponding to 300-330 deg. F. A diaphragm discharge valve at the end of the converter is automatically controlled by the level in the entry chamber so as to maintain a constant rate of throughput in the converter and consequently a uniform product. The Corn Products engineers expect to get in excess of 91% conversion in the new units.

The dextrose solution from the converter is mixed with a quantity of expanding bentonite which absorbs residual fats and proteins. The resulting mixture is filtered through an Oliver Pre-Coat filter, which automatically builds up a Dicalite pre-coat, filters, shaves and rebuilds the pre-coat. This is the first installation where a complete pre-coat filtration cycle has been controlled automatically.

The solution is next given a carbon decolorizing treatment, filtered through a Sweetland filter, and passed through anion and cation resin beds for removal of residual acid, salts and ash resulting from the hydrolysis. Again, this represents the first use of ion exchange in the commercial production of dextrose sugar.

The solution from the resin beds is concentrated from 10 to 30 deg. Bé. in a triple-effect Zaremba rising film evaporator. The liquor is given another carbon treatment, filtered, and concentrated to 39 deg. Bé. in a single-effect falling film Zaremba, another innovation in dextrose production.

The resulting liquor is pumped to the crystallizing building where it is cooled and passed through a horizontal, spiral-agitated, cylindrical crystallizer where saturation is controlled by circulation of cold water through the jacket and an internal cooling coil. Other than the steeping, this is the only batchwise operation in the entire plant. The crystallizers have a capacity of 110,000 lbs. of sugar each per batch, and one batch requires about 80 hours for crystallization.

When the sugar has reached optimum crystal size, it is dropped into Bird continuous centrifugals where it is washed and spun free of water. It is then dried in a rotary dryer, cooled and transported to the packing department where it is screened and packaged in 100-lb. bags. Packing is done by automatic electronic scales which fill 12 bags a minute.

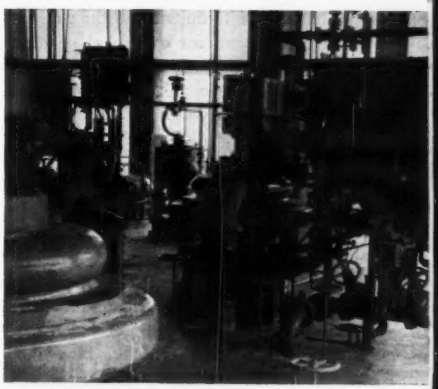
Omega proportioning feeders are used for introducing the bentonite, filter aid, and carbon into the process. Spent carbon is washed on an Eimco drum filter to recover the sugar syrup, an operation formerly carried out on plate and frame presses.

The writer wishes to express grateful acknowledgment to the following persons who helped provide the information for this article: J. Fred Morton, F. W. Holm and R. F. Heuhner of Corn Products Refining Co. and F. L. Whitney of the H. K. Ferguson Co.

Rotex screen shakers are used at several points in the plant for washing and separating.

This battery of three Reitz disintegrators separates the grain hull from the endosperm.

"Re-pulpers" grind up hard particles of combined starch and protein to permit separation.



Starch and protein are separated in a bank of 6 automatically-controlled Merco centrifugals.

Westvaco at Charleston, W. Va., produces much of the 40% of U. S. chlorine which emanates from the W. Va.-Ohio-N.Y.-Mich. salt deposit.

What's Ahead for the Alkali-Chlorine Market

by HERMAN W. ZABEL, Associate Editor

CHLORINE DEMAND NOW EXCEEDS that for its co-product, caustic soda. This unbalanced market promises gradual replacement of lime-soda caustic with electrolytic caustic and an eventual increase in soda ash prices before new ash capacity can be added.

LESS than one year ago black market prices could be obtained for caustic soda. Today the industry's plaint is, "What are we to do with all the caustic?"

If the demand for caustic alone determined whether it was produced, this condition of plenty would not be a problem. But most of our caustic is produced concurrently with chlorine, and the demand for that commodity appears insatiable. Chlorine is needed to meet expansion commitments in ethylene glycol and ethylene oxide. More bromine is needed. Expanding production of titanium pigments and metal will require more chlorine. More chlorinated solvents are required. Tetraethyl lead expansion calls for much more chlorine than will be obtained as a co-product from production of metallic sodium to be used in the TEL synthesis. And so it goes—everyone wants chlorine but there is no corresponding demand for caustic soda. A major exception is the synthesis of nylon intermediates at Victoria, Texas, which is reported to require about 50% more caustic than chlorine.

SOUTHWEST OVERSUPPLY

The results of this situation were felt in the Southwest first, where there has not been an increase in caustic demand comparable to the rapid increase in demand for chlorine. Production capacity in this area has expanded from practically nothing ten years ago to an estimated 1,300 tons per day—roughly twenty-six per cent of the total United States production capacity of over 5,100 tons per day—and it is still expanding. The plans of one of the larger alkali producers in this area indicate the seriousness of this problem. Although the company is further expanding chlorine capacity this year, a large percentage of the co-produced caustic is destined to replace lime in another part of the plant—just to solve the problem of its disposal until a market can be developed.

CHLORINE WITHOUT CAUSTIC

A desirable solution to the problem posed by the excess supply of caustic would be to manufacture chlorine without concurrent production of caustic. This is being done, and such production now represents about six per cent of today's chlorine production of 5,100 tons per day. When the non-caustic chlorine plants now under construction are completed, this percentage will be about eight per cent of the chlorine production at that time, expected to be about 5,400 tons per day.

Two processes account for this non-caustic production of chlorine: Separation of metallic sodium by electrolysis of molten salt, and the action of nitric acid on salt. Sodium nitrate, nitrosyl chloride, and nitrogen tetroxide are also formed by the latter reaction which, in effect, decreases the demand for soda ash, as sodium nitrate is normally prepared from nitric acid and soda ash. Only limited re-

lief, moreover, can be expected from these processes since the amount of metallic sodium and sodium nitrate that can be disposed of at an attractive price is the controlling factor.

Much attention has recently been given to the possibility of producing chlorine by the more modern versions of the Deacon process (oxidation of hydrogen chloride). A twenty-five ton per day unit has been designed (*CI, Sept., 1948, p. 371*) but no further information is now available. This process does not seem to be the answer either, for there are only a few places where hydrogen chloride is available in sufficient quantities and at low enough cost to make a plant economically feasible. Hydrogen chloride must be delivered to the unit at by-product prices.

One other possibility which may be of potential importance is the application of a Deacon-type oxidation to ammonium chloride instead of hydrogen chloride. If the huge tonnages of ammonium chloride produced at all soda ash plants were used in such a process, it could provide a neat solution to all the alkali industry's problems.

There are many other non-caustic chlorine processes but all suffer the same failing—they depend on the sale of some sodium compound to insure their economic success. This compound usually has either a limited market or a lower selling price than caustic soda, even if the price of caustic were to be reduced drastically. For these reasons, it is questionable that a solution to the current problem can be expected from this quarter.

TRANSPORT

Another way of selling excess caustic is to ship it to a section of the country where there is a market. This is being done to the limit of economic practicability; the freight which must be paid or, as it is usually termed, "equalized", by the producer entering a market outside his normal distribution area, sets this limit. Alkalies differ from higher-priced chemicals in that the percentage of the cost charged to freight can mount rapidly. It doesn't take a very long haul to add twenty-five per cent to the cost of caustic which usually sells for as little as forty dollars per ton.

Actually, removal of the oversupply to another part of the country does not constitute a solution to the problem. It merely substitutes a national oversupply for a regional oversupply.

In considering the caustic problem on a national rather than a regional basis, one must study the relationship between caustic soda and soda ash. Production statistics for caustic soda and soda ash (Figure 2) show that, barring too much "disinflation," within about three years the demand for soda ash, as such, will be equal to the total quantity which can now be

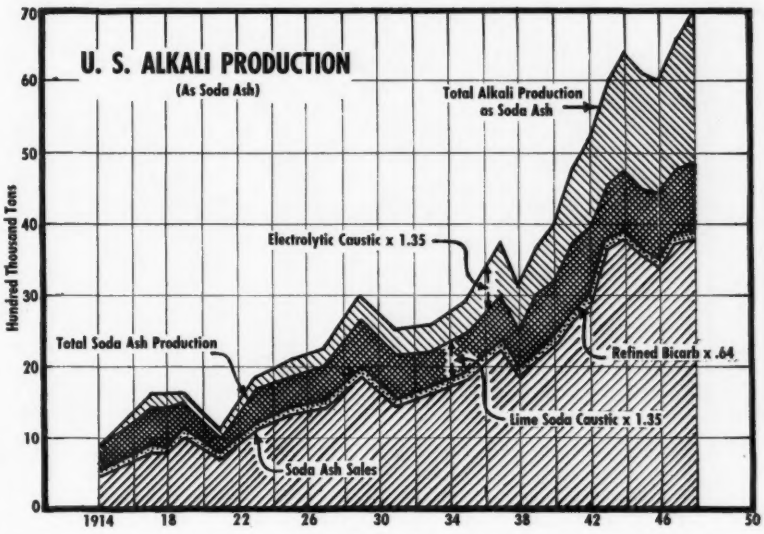


Figure 1

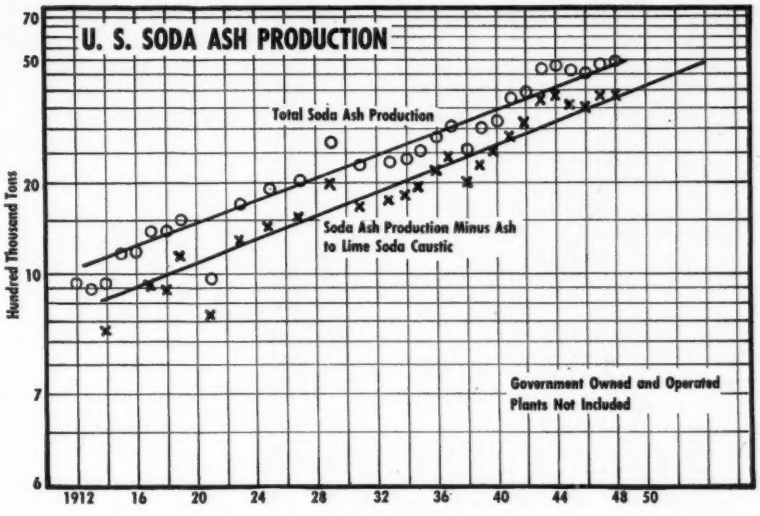


Figure 2

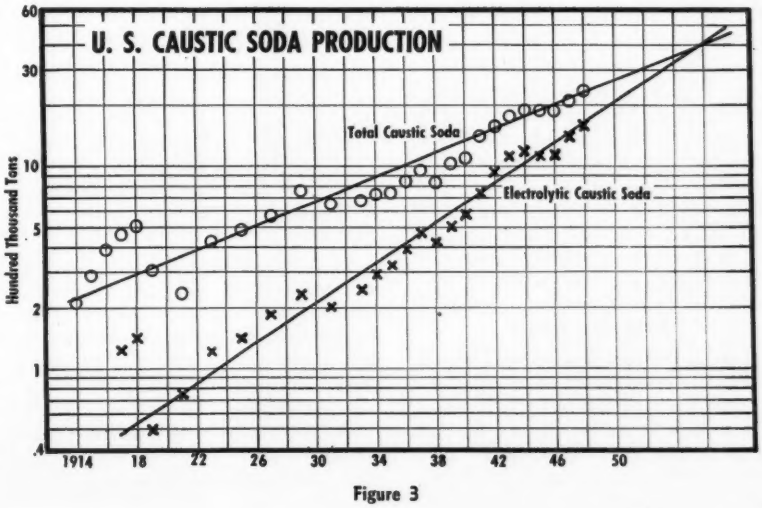
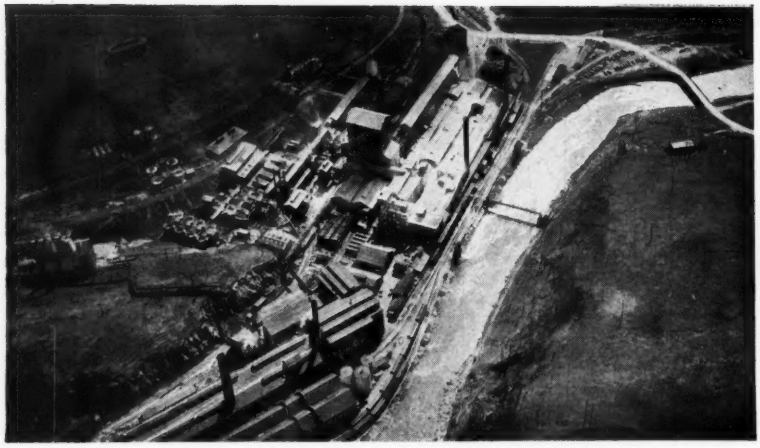


Figure 3



Mathieson's caustic-chlorine-soda ash plant at Saltville, Va., was the first Southern plant.

produced, including that now used for production of caustic soda. Some increases in capacity of present plants and increased production of natural soda ash in California and Wyoming can postpone this day. But this reprieve will be short, as it is impossible for the Western product to reach the huge Eastern market on a competitive basis, even with excessive freight equalization. It will be more economical to take care of increased soda ash demands by reducing the amount which is being causticized.

This conclusion can be confirmed by comparing the total production of caustic soda with the production of electrolytic caustic soda. If its growth rate continues as it has over the past thirty years (Figure 3), electrolytic caustic soda will be able to provide our total caustic requirements within about six years. Statistics being what they are, allowance cannot be made for technological changes. Moreover, trend lines are at best estimates. Thus one cannot say definitely that all caustic soda will be produced by electrolytic means by a specific date.

It is quite likely that soda ash will be the source of a certain quantity of caustic soda for many years. Local conditions affecting power, transportation, fuel, and other costs, as well as the character of local demand could provide areas where caustic may best be produced by causticizing soda ash. Nevertheless, it is reasonably certain that most lime-soda caustic will be replaced with electrolytic caustic within the next few years. Diaphragm cell caustic, however, must be purified before it can be used for production of rayon (*CI, August 1948, p. 230*).

SODA ASH COSTS

Further evidence that less soda ash will be used to make caustic as the long-term demand for soda ash as such increases, can be seen in the cost figures for such plants (Table I). Present plants were constructed at a cost of about $10,000 per ton of daily capacity whereas, if they were built today, they would cost about $20,000 per ton of daily capacity. These figures are for a thousand-ton-per-day-unit with no coking facilities. They cover not only the direct cost of the production facilities, but of steam, brine, and water supply, laboratory, office, etc.

TABLE I—ESTIMATED 1949 SODA ASH MANUFACTURING COSTS AT 80% OF CAPACITY

(Per Ton Light Ash—In Bulk)

	New	*Present*
Book Value Per Ton-Day of Capacity	$20.000.00	$3,000.00*
1.25 tons high-grade limestone @ $1.60 del.	2.00	2.00
1.1 tons salt @ $0.75 del.	0.83	0.83
0.1 tons coke @ $12 del. (for calcining limestone)	1.20	1.20
0.55 ton coal @ $7 del. includes boiler fuel)	3.85	3.85
Maintenance at 3.5% of investment	2.40	2.40
Wages, salaries, and misc. expense	2.65	2.65
Operating Cost	12.93	12.93
ADD:		
Depreciation @ 6%	4.14	2.07
Insurance and taxes @ 1%	0.69	0.50**
Manufacturing Cost	17.76	15.50
ADD:		
Selling, research and administration	1.90	1.90
Freight equalization	0.75	0.75
Total Cost of Sales	20.41	18.15
8% return after income taxes of 38%	9.27	1.77
	29.68	19.92
10% return after income taxes of 38%	11.60	2.22
	32.01	20.37
15% return after income taxes of 38%	17.38	3.32
	$37.79	$21.47

* Cost of new plant=$10,000/ton-day of capacity.
** Estimated.

All of the soda ash plants now operating are fairly old units, the last having been installed in the late 'thirties. Thus the depreciated book value of these plants will range up to a maximum of about $4,000 per ton-day of capacity.

A first surprise is that at present prices (about $20 per ton of light ash in carlots for large contracts), a 1,000-ton-per-day-plant would only gross about six million dollars per year—less than a third of the capital cost of the plant, $20 million. This is an unusually small turnover for a process industry and spotlights a major stumbling block in any plant expansion. For a plant of this size at least $1 million more would be needed to provide sufficient working capital. A study of the annual reports of various alkali companies indicates a working capital requirement of about 15-20 per cent of gross annual sales. Thus the total investment upon which a return must be provided is about $21 million.

A second surprise is provided by Table I which shows that construction of new capacity is a most dubious undertaking although present soda ash producers are able to make a reasonable return at $20 per ton. A totally new plant would show a loss of 40 cents a ton at current prices even before return on investment is considered. Yet, unless there is a pronounced recession, an expansion in soda ash capacity will probably be called for in certain areas within the next five years. This will mean a rearrangement of the alkali-chlorine price schedule.

FUTURE PATTERN

A probable sequence of events stemming from present conditions will be greater effort to move caustic to other parts of the country or overseas from the Southwest where the oversupply is the greatest. The availability of this supply plus additional new capacity, possibly abetted by a small price cut, will discourage production of much lime-soda caustic. A further factor in this decreasing production of lime-soda caustic will be the increasing *long-term* demand for soda ash which will enable producers to market the soda ash released by this substitution.

Because the distance which caustic soda can be economically transported is limited, other adjustments will have to be made. Unless consumers can pay a price for chlorine sufficiently high to offset the probable decrease in the price of caustic, expansion of the electrolytic caustic-chlorine industry will be discouraged.

An increased price for chlorine in turn will deter expansion of electrolytic units, and will discourage the use of chlorine-consuming processes. Further, it will whet the appetite of industry for an economic process for the production of chlorine without caustic.

The increasing demand for soda ash will call for soda ash capacity above that released from caustic production. However, at present construction costs, in which there is little prospect of a major decline, a new plant could not be considered a sound investment unless the price of soda ash were sharply increased. It would take a price increase of at least 50 per cent to make the investment attractive.

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Unlike ordinary valve bags, the SHUR-CLOSE overlapping valve action gives a quick, positive seal immediately after bags are filled. There's less dusting when packing and an absolute minimum of sifting when bags are packed.

And you get a second big dividend with the SHUR-CLOSE Valve. The exclusive overlapping action at the top of the valve, pipelines the material while the open slit at the bottom gives faster flow. SHUR-CLOSE Valve Bags step up production as much as one bag more per minute per tube.

If you pack fertilizer, chemicals, food products or flour, you should arrange immediately to have an A&S Packaging Sales Technician demonstrate SHUR-CLOSE Valve Bags in *your* plant using *your* filling machines.

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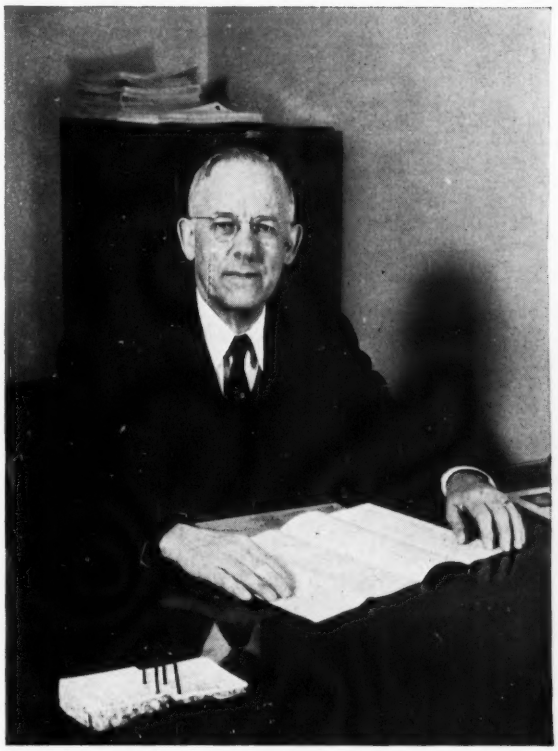
THE CHEMICAL PANORAMA

NEWS OF THE CHEMICAL PROCESS INDUSTRIES IN PICTURES

PEOPLE



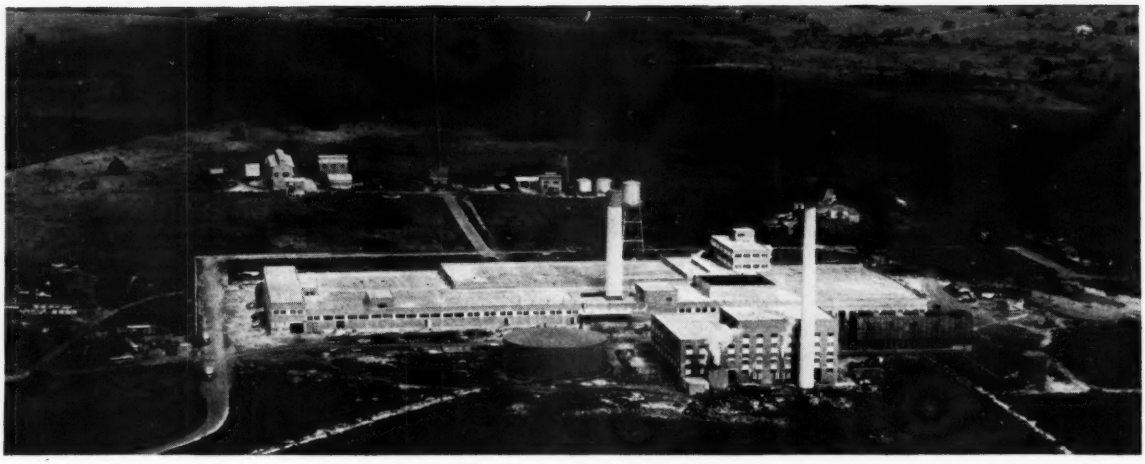
HARRY L. FISHER, director of research, U. S. Industrial Chemicals, has received the Charles Goodyear Medal of the American Chemical Society for outstanding achievement in the field of rubber chemistry.

JOSEPH FISTERE, elected president of Mallinckrodt Chemical Works. He was vice-president.

WILLIAM C. KEELEY, recently appointed executive vice-president of U. S. Industrial Chemicals, Inc.

DONALD N. McCORD, who has joined the Glenn H. McCarthy Interests. He will supervise plant and construction operations.

GEORGE T. FELBECK, center, vice-president, Carbide and Carbon Chemicals Corp., receiving the John Wesley Hyatt Award for achievement in plastics. Left, Donald S. Frederick, Rohm and Haas, and right, John D. Cochrane, Jr., The Formica Co., previous award winners.



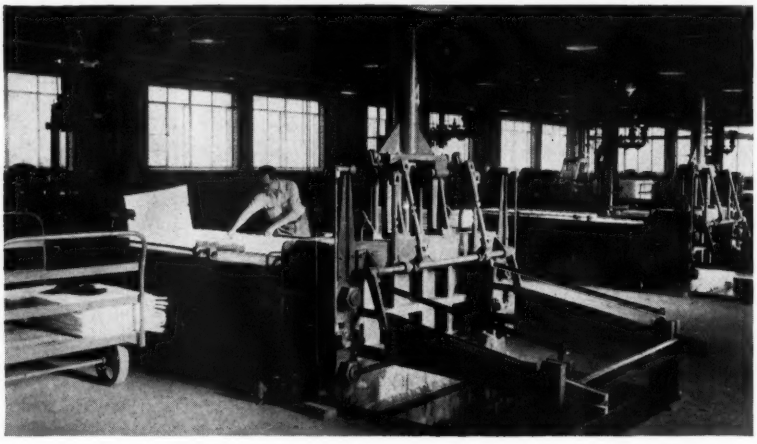
The new $17 million viscose rayon plant of the Cuban Rayon Co., situated on Matanzas Bay, 60 miles east of Havana. The carbon disulphide plant, which produces 40 tons daily, is on the far side of the main plant, and on the left. On the right is the sulfuric acid plant.

Modern Rayon Plant Built in Cuba

The Cuban Rayon Co. is now operating one of the world's most modern viscose rayon plants at Matanzas Bay, 60 miles east of Havana. Designed by Rayon Consultants, it has an annual production capacity of 4 million pounds of high tenacity yarn, 3 million pounds of continuous filament yarn and 6 million pounds of staple fiber.

The decision of Dayton Hedges, principal owner of the plant, to enter the rayon business was based on several factors: It was felt that rayon would continue to be in short supply at a time when rayon products are finding increasingly wide uses, and the demand for high tenacity yarn for tires and staple fibers for blending with other textiles is also expected to increase.

The owners feel that since they will be in competition with American manufacturers, large-scale, efficient production is absolutely essential to the success of the undertaking. Production machinery for the three types of fiber is placed in three parallel lines running the length of the plant. The viscose for all three is prepared in essentially the same manner (see pictures) in a multi-story chemical building, and is dispatched into one of three processes, depending on the final product. There are two viscose ripening systems, one of which is used for staple yarn and the other effects a three-way split for delustered, bright and tire cord yarn. A system of continuous deaerators reduces the time required for removing air from 15 to 18 hours to a few seconds.



Steeping, the first step in the preparation of viscose, is performed in hydraulic, end-opening steeping presses. The press charges range from 500 to 550 pounds of air dry pulp.

The steeped pulp is dumped into shredders by chute from the fifth-floor presses. Gravity flow of materials is used from the first step until the viscose is accumulated in blenders.

MEMO

Sharples Isopropylamine available in Tank Cars.

Reexamine production costs in light of availability and low price.

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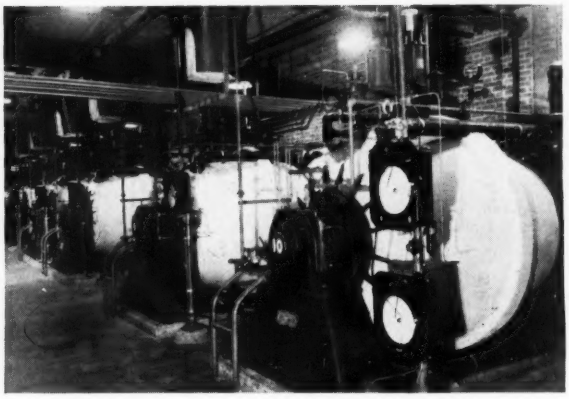
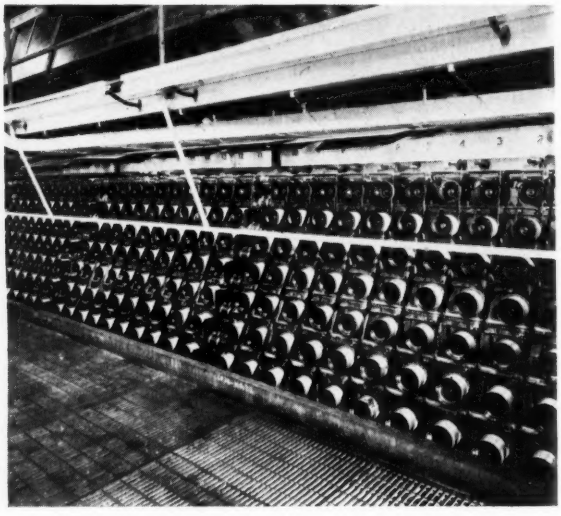
Modern Rayon Plant Built in Cuba (Continued)



The shredded charge travels down to alkali aging cans where it is aged for about 36 hours and then to wet churns for xanthation.

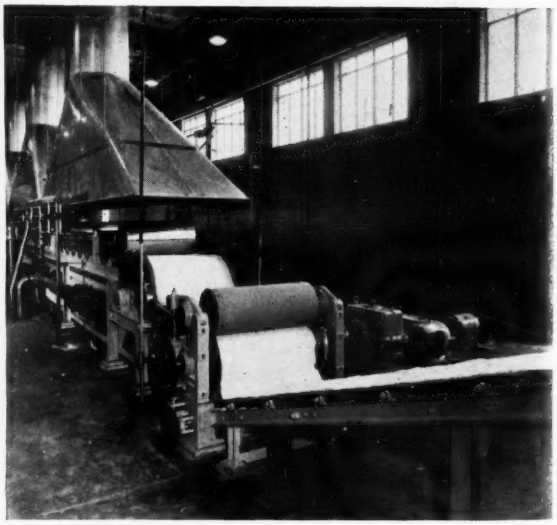
The xanthate, which is slurried with caustic and water in the churns, next goes to the dissolvers. The viscose is then blended and ripened.

Dialyzers for recovery of waste caustic from steeping operation. Recovery of caustic is extremely important since it must be imported.



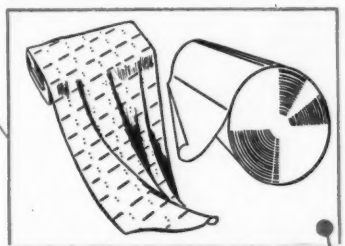
The process deck. There are 14 machines of 200 positions each, 12 of which produce textile yarn, and the other two tire cord.

The acid cutter of the continuous staple fiber process unit, which runs along the eastern side of the plant and operates continuously.



The purification unit. The staple fiber enters this from the acid cutter for acid removal, desulfurization and application of finish.

WINE
Clarifying and stabilizing agent



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INKS ***Modifying, stabilizing, sensitizing and coloring***

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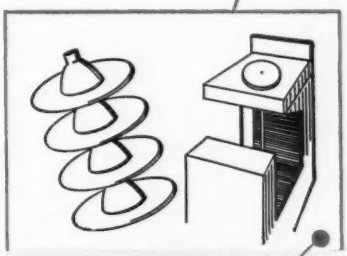

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- Low bulk
- Makes sparkling solutions
- Takes less warehouse space
- Free from foreign odors

ACID TANNIC is supplied in three grades

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U.S.P. XIII Fluffy	Pale-yellow Powder	100% passes No. 100 Sieve	About 65 fl. oz./lb.
U.S.P. XIII Powder	Light-yellow Powder	100% passes No. 180 Sieve	About 25 fl. oz./lb.
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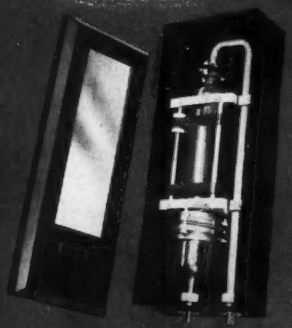

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Carbide Opens Research Center

Carbide and Carbon's new research center. Back of the main building is the shop and power house. At extreme back corner are the cooling towers that serve the high pressure labs.

Carbide and Carbon Chemicals Corp. is just putting into operation a new organic chemical research center near its South Charleston, W. Va., plant. Construction was begun on the unit in March, 1947, and when it is completed it will be the largest single laboratory project the corporation has ever undertaken.

At present, only the main research building, devoted to basic research, is being occupied; four large development buildings are to be occupied in the future. The completed project will house fundamental organic chemical and resin research, as well as process development work.

The laboratory proper is a three-story T-shaped structure, 325 feet long by 96 feet deep. It contains 69 individual laboratories and 48 offices, a large-scale laboratory, library, auditorium and storage and service facilities. Individual laboratories are designed as repetitive units in 13 foot wide sections. This gives a choice of room width of 13, 26, or 39 feet.

Each lab can draw on any one of 14 separate utilities from permanent outlets, including such services as cold brine, oxygen, hydrogen, nitrogen and steam at either 15 or 200 lb. per square inch.

To prevent contamination of office areas and cross-contamination between labs, each lab has an individual exhaust fan of sufficient capacity to remove the conditioned air supplied to the room.

Equipment for laboratory exhaust fans, on the 4th floor. When a fume hood in a laboratory is placed in operation, the air supply duct is opened and the exhaust fan speed is doubled.

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This picture of health and happiness has its counterpart in the lives of many. Previous ads on these pages have pictured V-C's contributions to scenes such as this—in soap and water, in bread and butter, in food and drink—the everyday essentials of a healthy, happy life.

Add to these V-C's service to the drug and pharmaceutical manufacturers and to the industries that serve them. V-C Chemicals which contribute to health and happiness through these services include high purity Phosphoric Acid, used as a nutrient in the production of the two great germ killers, Penicillin and Streptomycin; V-C Drug Grade Sodium Phosphates; Calcium Phosphates surpassing Drug Regulations in purity; U S P Bicarbonate of Soda; and other special chemicals of high purity used in the production of important medicinals.

V-C Chemicals are working hand in hand with industry AND NATURE as unseen factors in health and happiness.

For further information about these and other V-C Products write for V-C Chemicals Product Book.

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HAND IN HAND WITH INDUSTRY

Agents with selected evaporation properties mask successive odor phases of drying paint.

Principles of Odor Masking

by E. C. CROCKER
Arthur D. Little, Inc.
Cambridge, Mass.

ODOR-MASKING AGENTS add much sales appeal to chemical specialties at little cost, depend on skillful blending of a variety of materials.

IMPROVING THE ODOR of air is an old art that currently furnishes an active market for chemical specialties. Closely related to this field is the addition of odor to solid and liquid materials to mask any disagreeable odors they may possess, and thus avoid unpleasant odors in the air. While odorants for such purposes have a market somewhat limited in size, they are vitally important in the sale of such products as insecticides, glue, dry cleaning fluids, paints and varnishes, printing inks, rubber goods, soaps, fats, pharmaceuticals, petroleum oils and plastics.

In selecting an odorant for a product, a manufacturer must consider the nature of the odor to be masked, the properties of the product and the use to which it will be put, and the characteristics and price of available odor-masking agents. A proper understanding of the principles of odor masking is necessary to transform a material with a disagreeable odor into one with a pleasant, or no odor. This can be the difference between a product that no user will buy a second time and one that wins consumer acceptance.

ODORS REQUIRING MASKING

Surveys were made about fifteen years ago to determine the most generally objectionable types of odor. The survey made by Givaudan-Delawanna, Inc.[1] found glue to be the most disliked odor, and after that, kerosene, drying paint, dry cleaning fluid, dyed fur, raincoats, rubber footwear, gasoline, drying varnish, oilcloth, rubber goods, ammonia, moth balls, artificial leather, printing ink, etc. Dislike of such odors holds today, although the objectionable characteristics of some of these substances have by now been eliminated, and a few new materials have appeared, such as chlorinated phenol and the plasticizers used in certain plastics.

Masking of odors is mostly the covering of "stinks"—odors which are not wanted, whether inherently pleasant or otherwise. On this assumption, masking is most satisfactory when it produces an odor of minimum obviousness rather than one of distinct pleasantness. To occidentals, animal odors of all kinds are generally offensive. The odor of glue is thoroughly animal-like, the odors of some drying paints are fishy, while those of many cuts of petroleum are rancid. One of the most objectionable and persistent of odors is that of rotting casein, fortunately now rare since paper-coaters have learned to prevent it by plant sanitation.

Masking agents are important in certain pharmaceutical products to hide the presence of bitters, salts, hormones and vitamin oils. The substances so used, as also those for label glues, have to be edible, and are drawn from the "flavor" category of aromatics, which include taste-producers as well as straight odorants. These include oils of peppermint, wintergreen, sassafras, cloves, cinnamon and anise, and synthetics such as vanillin and coumarin.

Odor prevention is often possible through the use of preservatives of one type or another, such as antioxidants for fats and oils, mold inhibitors and antiseptics.

TIME FACTOR IN MASKING

Odors may be transient and need coverage for only a period, as with paint and printing ink, objectionable as these may be for a matter of days. In other instances, especially with petroleum oils and certain fats and soaps, objectionable odors appear only after an initial "induction period" during which they are relatively inodorous. Finally, there is the type of odor that is produced continuously, because of diffusion from within, as with rubber, or because of chemical or bacterial action. This calls for either a long-lasting masking agent or for keeping the article in question in a well-ventilated atmosphere. Thus, many degrees of volatility are needed for producing masking agents, from the purely ephemeral to the lasting power of the musks. The following table classifies odorants according to their volatility.

TIMING OF ODORANTS FOR MASKING USE[2]

VERY VOLATILE
Acetophenone, benzaldehyde.

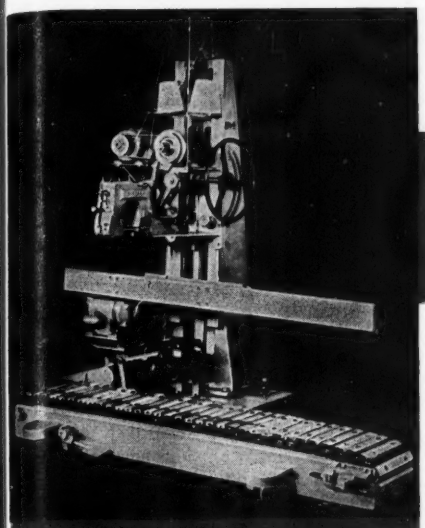
MEDIUM VOLATILE
Benzyl acetate, ethyl benzoate, isobornyl acetate, methyl salicylate, oils of lavender, spike lavender, pine needles, spruce needles, wintergreen, and citronella.

MEDIUM PERSISTENT
Camphor, linalool, safrole, terpenyl acetate, citral, geranyl acetate, anisic aldehyde, methyl heptine carbonate, phenylacetic aldehyde, eugenol, ionone, terpineol, oils of peppermint, bois de rose, sassafras, anise, star anise and clove.

PERSISTENT
Cinnamic aldehyde, geraniol, phenylpropyl alcohol, hydroxycitronellal, Yara Yara, Nerolin, coumarin, cyclamal, oils of cassia, cinnamon, cedarwood and geranium.

EXTREMELY PERSISTENT
Musks xylol, ambrette and ketone; vanillin,

Most insect sprays use low-odor kerosene, but odors of active insecticides require masking.



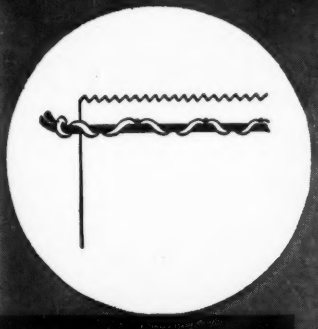
MODEL "E 1" (portable)—one operator can close up to 15 filled bags per minute. A single foot pedal controls both conveyor and sewing head. Handles both paper and textile bags.

Strong, Tough Closures

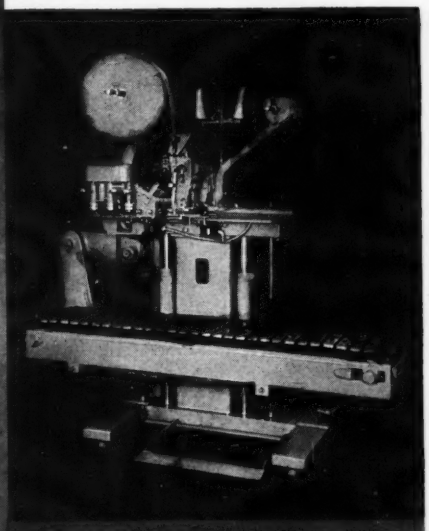
—mass produced!

Mechanize your closing of heavy-duty, multiwall paper bags, with BAGPAKERS.® You swing into production line speed—up to 15 bags per minute. BAGPAKERS apply famous "cushion-stitch" closure that absorbs strains and won't pull out. When sealed with strong BAGPAKER tape, the "cushion-stitch" closure is moisture-resistant, contamination-proof and *sift-proof.*

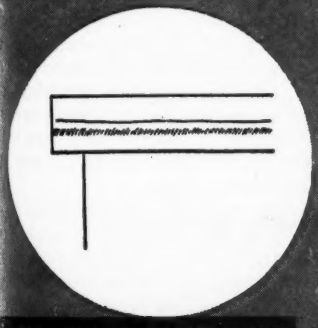
Talk over your closing and handling methods . . . your multiwall paper bag requirements, with a BAGPAK engineer. He knows ways to speed operations and cut costs.



ALL BAGPAKERS MAKE THIS FAMOUS "CUSHION-STITCH"



MODEL "DA" (portable) applies taped "cushion-stitch" closure. One operator, filling and closing, can handle 2 to 4 bags a minute . . . 6 to 12 where filled bags are delivered to BAGPAKER conveyor. Sewing operation starts and stops automatically—no tape wasted.



TAPED CLOSURE IS MOISTURE RESISTANT—SIFT PROOF—TOUGH
Taped closure is effected on Model "DA"

BAGPAK DIVISION

INTERNATIONAL PAPER COMPANY, Bagpak Division • 220 East 42nd Street, New York 17

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Astrotone, benzyl salicylate, oils of vetiver, patchouli and sandalwood.

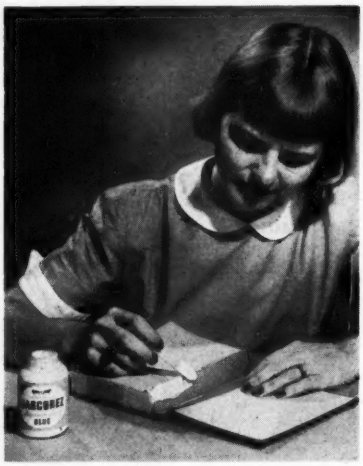
There is often more or less "fixation" by the substances to which odorants are added for masking, which means that the odors are held more firmly than simple volatility might indicate. A prime example of such fixation is the product Celluloid, where the specific comparatively volatile substance camphor is held so strongly by the nitrocellulose that it is practically impossible to remove its odor. Fixative substances may act specifically or they may hold all volatile odorants relatively strongly, releasing the mixture of odorants of different volatilities more or less as a unit, rather than in succession, as might be anticipated. Soap has considerable mixture-fixation properties of this type. Since fixation behaviour is not at all uncommon, it is desirable practice to fit the odorant to the product by cut-and-dry testing.

Mixtures of odorants are usually more effective as well as more interesting as maskers than are single pure substances. Because of this fact, essential oils, which are mostly mixtures, are particularly useful, especially when reinforced with one or more of the cheaper synthetics. Frequently, such mixtures cost only $1 to $2 per pound. There are some mixtures, however, which cost far more than this by the pound but are still economical to use, because they are well adapted to the product and need be used in very small proportion.

ART OF ODOR MASKING

While there is no evidence that true odor neutralization is possible, it is commercially practicable to lesson the unpleasantness of most odors by discreet small additions of suitable odorants. The masking obtained is masking of the unpleasantness rather than of the odor itself, but the resultant neutral odor is often unnoticeable. Such masking is an artistic achievement, not to be confused with mere swamping of a weak unpleasant odor by a stronger pleasant one. It is accomplished in principle by making the original unpleasant odor an ingredient of an odor composition and completing the blend with a minimum of other materials to reach an unnoticeable or slightly pleasant blend suitable to the end-use of the product. The ingredients chosen for this purpose must have a volatility similar to or less than that of the original odor, and be equally stable in the air, so that the odor correction attained will last long enough to be practicable.

Some years ago, it was customary to add a small quantity of nitrobenzene to kerosene, to "neutralize" its odor. The term "neutralization" was appropriate in this instance because the nitrobenzene was commonly added from a chemical burette, a little at a time, until the point was reached when the kerosene odor seemed to disappear and yet that of nitrobenzene was not noticeable. There was a critical small proportion that just hid the kerosene odor and 20 per cent more or less showed up one or the other substance. Today, the poisonous nitrobenzene must not be used in this way, but other cheap odorants are available, such as pine, spike



Synthetic glues for animal glues illustrate the trend to use of materials with less odor.

lavender and rosemary oils, and these work satisfactorily. Present-day flysprays start with relatively low-odor kerosenes, but still need masking to cover the odor of the active insecticides. Insecticide odorants have to be breathed, so should be as free as possible from toxic and irritating substances. Such simple food and candy synthetics as methyl salicylate, safrol, coumarin or vanillin are commonly used, together with a touch of oil of geranium or of geranyl esters.

REPLACEMENT OF MATERIALS

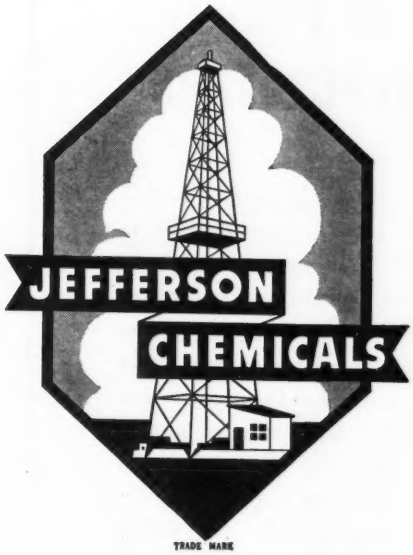
Materials which have unpleasant odors tend to be displaced by others with less odor, and it is one of the disappointments of the odor masker that by the time he has done a superb job of masking, the article often is no longer in use. Synthetic glues are fast replacing animal glue, plastic-treated cloths are replacing oilskins, oilcloth and raincoat materials, plastics are replacing rubber around food containers, and many interior paints now have alkyds taking the place of plain drying oils. However, some materials, such as those made of rubber, may need to have their odor masked for a long time ahead, and there is a sizable business in rubber re-odorants, generally of complex character, that overcome the objectionable odors. Many textiles benefit from masking, with light, fresh odors to hide any soapy or fatty finishing materials, dyes, or softeners. Occasionally, odorant is added to the point not only of deodorizing, but of faint perfuming. Paint for home interiors is commonly neutralized in odor, sometimes with great success, even to the point that a room may be used without complaint when the paint is barely firm, whereas without added odorant there would be much objection to the odor.

There is greater need for such paint deodorization today with more amateur decorators doing their own work, for such people are much less inured than the professional painter to objectionable odors.

Occasionally, printing inks have masking agents added, to cover the "awkward" period of the first few days after printing. Coumarin and vanillin were once recommended for this purpose. In general, however, masking should be done with a mixture of odorants rather than with any one, for mixtures are usually less evident than single odorants.

One dealer in odorants[3] suggests use of the cheaper essential oils for general masking—citronella, lemongrass, peppermint and sassafras, besides cedarwood, cedarleaf and pine oils. Other dealers[4] advise the use of their proprietary mixtures, called "compounds," especially devised and effective for covering specific odors. These compounds are skillfully contrived to have the right evaporation characteristics to cover the successive phases of odors, such as the solvent and drying oil periods of paint odor, the "airing-out" or the lasting phases of the odors of oilcloth, rubber, etc. A volatile odorant such as citronella oil will cover the odor of the thinner of the paint, which is all evaporated in a few hours, whereas blends containing vanillin and musk, which are both fragrant and slowly volatile, are needed to cancel the rancid-odor character of drying paint oils, which remains evident for several days. One dealer[5] sells a test-kit of masking agents, with suggestions and directions for the masking of many kinds of industrial products. After the user finds the kind and effective amount, he can then purchase the material in bulk. Other companies tailor-make masking agents to suit the product and the user.[6]

In general, masking agents have to be used with great restraint around food products, for eating the food may be a most sensitive method for detecting the presence of masking agent in or around the container of the food. This does not rule out but seriously limits the use of even non-irritating and non-poisonous masking agents in the printing inks or varnishes used on food containers. The composite of odor and masking agent may, however, be less noticeable or ob-



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ODOR MASKING (Continued)

jectionable than the odor alone. Foodstuffs, whether of watery or fatty type, tend to be accumulators of all odors, even from atmospheres or containers that of themselves seem odorless. The problem here is best solved by avoiding the contaminant rather than hiding it. Even cooking may not succeed in driving off all of the accumulated odor, particularly when the containers become scented with some of the modern chlorinated organics used for insecticides, fungicides and antiseptics.

QUANTITY AND COST

The quantity of agent necessary to neutralize an objectionable odor, but not to create a perfume, is generally less than 1 part in 1,000 and may be as little as 1 part in 20,000, depending upon the odor to be covered. Fly-spray odorant compositions, to be used in the amount of 1 oz. in 10 gallons of refined petroleum, cost $2 to $5 per lb. This figures out to 1.2¢ to 3.1¢ per gallon finished product. One producer's proprietary rubber odorants, used at 4 oz. per 100 lbs., work out to about 0.75¢ per lb. of finished rubber. One part of odorant to 3,000 to 8,000 parts of product is common. Suppose an odorant costs $2 per pound, and that 1 part in 5,000 is adequate; the cost of odorant will work out to .04¢ (1/25 cent) per pound of product. It is usually only when one has a strong or irritating odor to cover that cost becomes an important item.

Odor masking does not appear to offer a tonnage market for odorants, or one which is capable of the rapid development enjoyed by such specialties as air odorants or aerosol-propelled insecticides. Materials for masking the odor of manufactured products inherently have only a limited industrial, and no consumer, market. Thus the consumption of an odorant in the masking agent field depends on the transient requirements of particular products and the preferences of the men responsible for achieving deodorization. There is no universal deodorizing material for incorporation into manufactured goods. The masking business depends, in the last analysis, upon the art and skill of the odor-blender, drawing upon a wide variety of available materials.

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4. Sindar Corp., New York: Parodors, Treodors, Nacene, etc.
5. Cargille Scientific, Inc., New York, "Masked" set.
6. Van Amerigen-Haebler Co., New York, and others.

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Points to Consider in Choosing Chemical Plant Locations

by ROBERT S. ARIES,
R. S. Aries & Associates,
Brooklyn, N. Y.

IT IS EASY TO NEGLECT SOME of the many factors which must be taken into account in selecting a plant site. Not all of the factors listed here will apply, nor will all of the pertinent ones have equal weight.

USING THE LIST

Step 1: From the check list select those factors which pertain to your chemical plant location problem.

Step 2: Set up maximum and minimum values for each of the pertinent factors, if possible. For example, for "power rates", establish the maximum power cost at which the plant can operate. Then eliminate all locations which fall outside this maximum.

Step 3: Assign a weight, W, to each of the pertinent factors, according to the importance of each. The value of W can range from 1 to 10, the value 10 showing extreme importance, and the value 1 showing little importance.

Step 4: Analyze each location by assigning a rating, R, to each factor for each of the locations considered. The value of R can range from 1 to 10, the value 10 showing that the locality considered was perfect in respect to that factor, and the value 1 showing that the locality was very poor in respect to that factor.

Step 5: Compare localities by computing the sum of the WR products for each locality.

The following simplified problem will illustrate the method. In the analysis of the location of a certain chemical plant, it was found that there were 7 pertinent factors. Each of these was assigned a weight of W in accordance with the method described in Step 3. Two communities were then considered, and ratings R, were assigned to each of the factors for each locality as described in Step 4.

The localities were then compared by computing the sum of the products of R and W for each of the localities considered as shown in the accompanying table. It is seen that Community I is superior to Community II.

CHECK LIST

I. Change in Present Location
- A. Cost of disposal of old plant
- B. Cost of moving if already established
- C. Delays in meeting orders during relocation

II. Climate
- A. Elevation
- B. Humidity
- C. Precipitation
- D. Temperature
- E. Natural disaster frequency (i.e., tornadoes, storms, floods, forest fires, earthquakes, hurricanes, windstorms, heavy snow, sleet, frost, lightning, tidal conditions, sand or dust, etc.)

III. Communication
- A. Postoffice service
- B. Mail service
- C. Telephone service
- D. Newspapers
- E. Radio
- F. Special communication facilities

IV. Community
- A. Housing
  - 1. Hotels
  - 2. Houses
  - 3. Apartments
  - 4. Rentals
- B. Medical facilities
  - 1. Disease rates
  - 2. Hospitals
  - 3. Doctors
  - 4. Air-borne dust
- C. Cultural facilities
  - 1. Theaters
  - 2. Library service
  - 3. Art
  - 4. Music
- D. Churches
- E. Educational facilities
  - 1. Trade schools
  - 2. Apprentice courses
  - 3. Foreman's courses
  - 4. Professional training
- F. Recreational facilities
  - 1. Parks
  - 2. Social organizations
  - 3. Clubs
  - 4. Entertainment
- G. Types of local government
  - 1. Debt service charges of local government
  - 2. Debt limit of local government
  - 3. Bonded indebtedness of local government
  - 4. Attitude of local government
  - 5. Political attitudes
  - 6. Garbage disposal
  - 7. Street cleaning service
  - 8. Street lighting
  - 9. Police protection service
  - 10. Fire protection service
  - 11. Paving
  - 12. Population congestion
  - 13. Laws applying to industry
  - 14. Character of present industry
  - 15. Personal contact with men in similar industries
  - 16. Close-at-hand sources of information
  - 17. Research facilities
  - 18. Repair facilities
  - 19. War risk (closeness to prime targets)
  - 20. Effect of new plant on community
  - 21. Grading & inspection facilities
- H. Shopping Centers

V. Financing and Insurance
- A. Corporate laws
- B. Bank facilities
- C. Availability of financing
- D. Corporation fees and organization expense
- E. Insurance rates
- F. Fire insurance rates

VI. Labor
- A. Wage rates
- B. Minimum wage laws
- C. Birth rate
- D. Death rate
- E. Standard of living
- F. Percentage of home owners
- G. Percentage filing federal income tax returns
- H. Per capita private telephones
- I. Stability of employment
- J. Cost of living
- K. Type of labor
  - 1. Literacy rate
  - 2. Availability of management personnel
  - 3. Efficiency of labor
  - 4. Native skills
  - 5. Pride in craftsmanship of labor
  - 6. Unskilled labor resources
  - 7. Nationality
  - 8. Predominant foreign-born nationalities
  - 9. Sex
  - 10. Skilled labor resources
- L. Employment trends
- M. Trends in rate of production
- N. Labor laws
- O. Labor regulations, women
- P. Unions
- Q. Labor dispute record
- R. Cost of training new workers if already established
- S. Absenteeism rates
- T. Migratory trends

VII. Markets
- A. Nearness to markets
- B. Prestige of location
- C. Nearness to distributors
- D. Nearness to export facilities
- E. Trading area
- F. Extent of market
- G. Nature of market
  - 1. Single buyers or scattered buyers
  - 2. Industrial and institutional
- H. Ease of making contact with brokers, agents, export middlemen
- I. Delivered-to-customers cost of product
- J. Buying habits
- K. Competition

VIII. Power and Utilities
- A. Power resources
- B. Power rates
- C. Fuel resources
- D. Electric service
  - 1. Off-peak power costs
  - 2. Phase
  - 3. Power factor
  - 4. Transmission lines
  - 5. Power voltage
  - 6. Power current available
  - 7. Power frequency
- E. Gas service
- F. Utility rates
- G. Water power
- H. Coal
- I. Oil
- J. Quality of fuel
- K. Extent of fuel supply
- L. Fuel, analysis
- M. Fuel, type
- N. Steam volume and pressure available

IX. Raw Materials
- A. Mineral resources
- B. Natural resources
- C. Agricultural crops
- D. Timber resources
- E. Location of raw materials
- F. Location in relation to suppliers
- G. Availability of subcontractors if required
- H. Availability of shipping and packaging materials

X. Site and Buildings
- A. Usefulness of existing buildings
- B. Floor loading factor
- C. Real estate costs—lease & purchases
- D. Real estate availability
- E. Foundation conditions of soil
  - 1. Bed rock levels
  - 2. Water level
  - 3. Chemical features
  - 4. Objectionable soil pests
- F. Soil conditions
- G. Topography
  - 1. Drainage
  - 2. Contours
  - 3. Nearness to flowing water
  - 4. Grading required
- H. Real estate assessments
- I. Zoning laws
- J. Plant inspection requirements
- K. Building codes
- L. Cost of plant erection
- M. Provision for expansion
- N. Storage facilities
- O. Room for expansion
- P. Agreeableness of surroundings of the site—nearness to other structures
- Q. Resale value
- R. Availability of facilities & raw materials for plant erection
- S. Engineering services required
- T. Rights of way
- U. Permits and privileges

XI. Taxes
- A. Personal property tax
- B. Property tax
- C. Corporation tax
- D. Death or inheritance tax
- E. Inheritance tax
- F. Estate tax
- G. Homestead tax credit
- H. Workmen's compensation
- I. Unemployment compensation
- J. Use tax
- K. Sales tax
- L. Real property tax
- M. Unemployment insurance tax
- N. License taxes
- O. Tax or rent concessions offered
- P. Tax trends
- Q. Degree of tax delinquency on books

XII. Transportation
- A. Transportation facilities
  - 1. Air transportation
  - 2. Land transportation
  - 3. Water transportation
  - 4. Barge service
  - 5. Freight rates
  - 6. Passenger train service
  - 7. Air passenger service
  - 8. Port facilities
  - 9. Transportation from home to work
  - 10. Railroad switching facilities
  - 11. Freight train service
  - 12. Collection and delivery service
  - 13. Consolidated LCL service
  - 14. Express service

(*Turn to page 1028*)

WEIGHING PLANT LOCATION FACTORS

Factor	Weight W	Rating, R Community I	Rating, R Community II	Product, RW Community I	Product, RW Community II
(1) Labor	2.5	7	9	17.5	22.5
(2) Fuels	3.3	3	1	9.9	3.3
(3) Power	1.0	3	1	3.0	1.0
(4) Living conditions	1.0	4	3	4.0	3.0
(5) Transportation	0.5	8	4	4.0	2.0
(6) Climate	0.5	4	3	2.0	1.5
(7) Supplies	0.6	6	6	3.6	3.6

Aggregate Score, Community I, Sum RW = 44.0
Aggregate Score, Community II, Sum RW = 36.9

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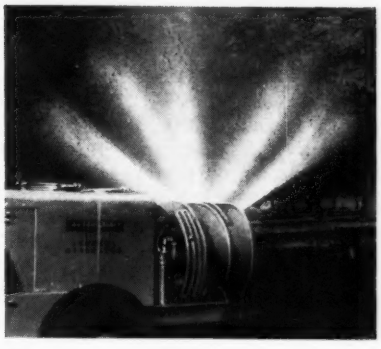

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1928

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NEW PRODUCTS & PROCESSES

Hydrazine NP 910

Mathieson's Army contract makes some hydrazine commercially available.

Hydrazine in anhydrous form and small quantities of hydrazine sulfate are now being produced by Mathieson Chemical Corp. Operation of the facility for these products is the result of a contract with the Army Ordnance Department, but limited amounts are also being supplied to commercial interests for test purposes.

Many potentially valuable commercial uses are being investigated, and patents already issued suggest that the products may find application in the manufacture of insecticides, bactericides, and plastics, and in textile processing. Also, since hydrazine is of value in chemical laboratories as an analytic reagent and in the production of organic intermediates, it is probable that similar uses on a commercial scale will be developed as the compound increases in availability.

Chlorinated Hydrocarbons NP 911

Non-flammable chlorinated compounds suggested for variety of industrial uses.

First of a series of new chlorinated hydrocarbons has been announced by Pennsylvania Salt Manufacturing Co. It is clear, viscous resinoid, with good thermal stability and showing no hydrolysis during 16 hours' contact with water at room temperature and at 100°C. The product is known as Chlorinated Hydrocarbon-70.

The compound has no flash point and no fire point and is compatible with such resins as vinyl chloride, styrene and rosin. At room temperature it is completely soluble in most alcohols, ketones and hydrocarbons.

The new chlorinated hydrocarbons have properties which suggest their use in many industrial applications. Among these are: as a plasticizer; as a flame retardant; in the manufacture of adhesives; and in other formulations for the impregnation or coating of wood products, textiles and paper.

NP 912

Tetrahydrophthalimide

Farchan offers intermediate on pilot-plant scale.

The Farchan Research Laboratories is now in pilot-plant production of tetrahydrophthalimide (4-cyclohexene-1,2-dicarboximide). This active olefinic compound lends itself readily to the formation of N-alkyl derivatives and adducts to the double bond for use as intermediates in the manufacture of insecticides, insect repellants, pharmaceuticals, dye-stuffs and general organic synthesis.

The product is a white crystalline solid having a molecular weight of 151.1 and a melting point of 134-5°C.

Rubber Accelerator NP 913

New accelerator combines thiazole and thiuram structures in one molecule.

Sharples Chemicals Inc. has developed a new self-activating primary accelerator for the rubber industry. It will be marketed under the trademark, Ethylac. The new accelerator combines high activity with good delayed action and good processing properties. It is practically dust free and is non-discoloring. Ethylac requires no special handling precautions and has excellent storage stability.

Chemically, Ethylac is 2-benzothiazyl-N, N-diethylthiocarbamyl sulfide; it thus combines the important chemical structures of both thiazole and thiuram types of accelerator.

Ethylac has been under development for two years and successful factory runs have been made. It is now available in commercial quantities.

Detergent NP 914

Sodium aroylsulfopropionate developed to commercial point.

The first in a new series of surface-active agents has been commercially developed by E. F. Houghton & Co. The new product, known as Surfax 1288 (*CI, June 1948, p. 907*), is a wetting agent which also has excellent rewetting properties; it has no marked detergent properties. It is economical in application as it is effective in extremely low concentrations.

Cyanuric Chloride NP 915

Versatile intermediate made in pilot plant by Cyanamid.

Pilot-plant production of cyanuric chloride has been announced by the American Cyanamid Co. Used abroad for the preparation of dyestuffs and of optical bleaching agents for whitening textiles, cyanuric chloride also offers possibilities for the syntheses of pharmaceuticals, high polymers, explosives, rubber chemicals, mothproofing agents, surface active agents, and plasticizers.

Cyanuric chloride is a solid melting at 146°C. Its boiling point is 190°C., and it is not decomposed at the boiling point. It is hydrolyzed by water, in which it is very slightly soluble. It is soluble in most organic solvents.

It possesses a high degree of reactivity, somewhat resembling a carboxylic acid chloride, and the reactivity of the chlorine atoms differs sufficiently to permit the stepwise introduction of the same or different substituents. Reaction readily occurs with compounds having labile hydrogen atoms, such as amines, alcohols, phenols, mercaptans, and malonic esters.

Hydrocarbon Resin NP 916

Insulating resin made by condensation of alkyl naphthalenes.

A new type of synthetic resinous hydrocarbon of unusual stability and extremely low electrical loss is being produced commercially by Kenrich Corp. This material is being made under arrangements with Socony-Vacuum Oil Co., Inc., who initiated the development and is seeking patent protection. It is produced by catalytic condensation of specific alkyl naphthalenes

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Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

NP 910	NP 914	NP 918	NP 922	NP 926
NP 911	NP 915	NP 919	NP 923	NP 927
NP 912	NP 916	NP 920	NP 924	NP 928
NP 913	NP 917	NP 921	NP 925	

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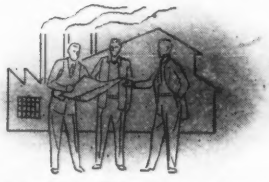

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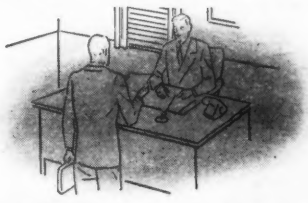

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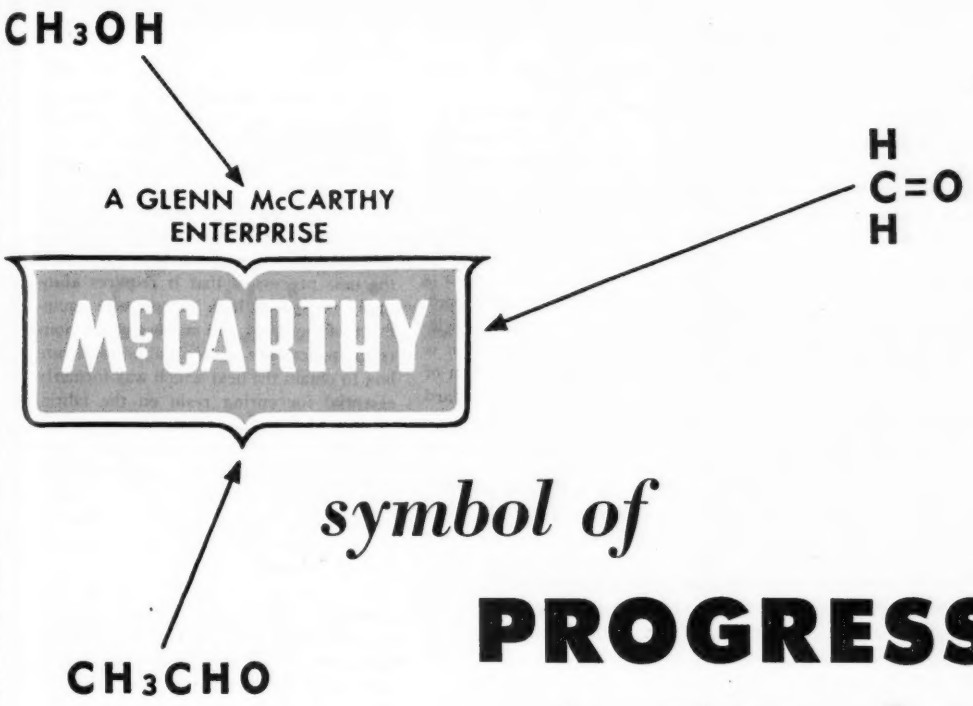

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PROGRESS

in petro-chemicals

Progressive research by the engineers and chemists of the McCarthy Chemical Company is opening New Horizons in Hydrocarbons—producing primary and intermediate chemicals through more economical, more efficient processes that mean more abundant, uninterrupted supplies for the Chemical Industries.

One of the most recent results of this **progressive** research in the petro-chemical field is the production of oxygenated hydrocarbons, now achieved through the extraction of oxygen from the air on a tonnage basis in the newly-completed McCarthy Chemical Company plant at Winnie, Texas. This development affords amazing new process economy and efficiency; more importantly, it permits the marketing of chemicals to precision specifications through more accurate production controls.

Thus, the Chemical Industries are served by this investment in **progressive** research—research that also furthers the ends of conservation of our valuable natural resources by converting yesterday's wastes into today's usable raw materials.

NOW AVAILABLE

- 37% INHIBITED FORMALDEHYDE
- 37% UNINHIBITED FORMALDEHYDE
- METHANOL
- ACETALDEHYDE
- PROPANE
- BUTANE
- GASOLINE
- KEROSENE
- FUEL OILS

For prompt, sure delivery, McCarthy Chemical Company operates a fleet of 10,000 gallon tank cars, specially lined to guard against contamination, specially insulated against temperature changes. The Company also maintains storage, dock and loading facilities on deep water.

McCARTHY CHEMICAL COMPANY

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followed by purification and high-vacuum distillation. Offered under the tradename "Kenflex," several grades are available in quantity.

One of the products, Kenflex A, is derived from dimethyl naphthalenes: it has a drop melting point of about 160°F., a viscosity of approximately 300 centistokes at 210°F., an initial boiling point in excess of 400°F. at 2 mm., and a dielectric dissipation factor of about 0.0025 at 212°F. Allied materials of different viscosities and melting points are made by selection of the proper alkyl and cycloalkyl substituents.

Because of their high degree of aromaticity, Kenflex products exhibit outstanding compatibility with a wide variety of resins. They have tackiness, non-volatility, and electrical properties comparable to the polybutenes, but are opposite in viscosity index and solvent power. Thus, they may be blended with most oils or resins to give compositions which will impregnate or extrude easily at processing temperatures and exhibit highly viscous or tough characteristics under usual operating conditions.

Kenflex is recommended by the manufacturer for vinyl insulated wire, electrical cable filling, potting and caulking compounds, rigid vinyl moldings, adhesives and sealing compounds, inks, paints and varnishes, high temperature lubricants, hot melt coatings, insecticides, vinyl floor tile and composition rollers.

Modified Rubber NP 917

Modified natural rubber is more uniform, easier to process.

Natural rubber expressly prepared for special purposes has been introduced by Socfin Company, Ltd., of Malaya, into the American market. Uniform in certain important chemical and physical properties, it will enable manufacturers to "short cut" processes and streamline production.

Plastorub is a modified rubber which is chemically plasticized in its liquid latex form before it is sheeted and dried on the plantation. At the consuming factory it is ready for final processing in a fraction of the time it takes to prepare standard smoked sheets. Power consumption is lower and less heavy equipment is required for its use.

Products made from Plastorub match the appearance and performance of similar products made from carefully selected lots of the highest quality rubbers, yet are produced more quickly and economically.

Plastorub is distributed in the U.S.A. by Socfin's distributors, Latex Distributors. Inc.

Shrinkage Control NP 918

Low-temperature resin application simplifies use, gives better results.

A new process which makes it possible to apply Lanaset resin to wool at a low temperature has been developed by American Cyanamid Company's Textile Resin Department.

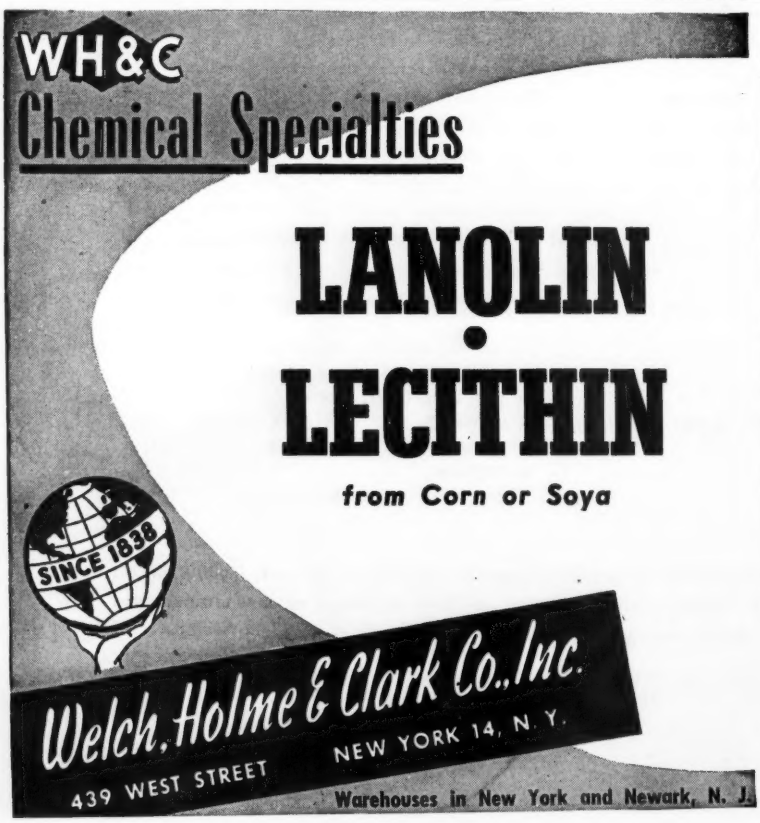
A melamine resin, Lanaset has been used on a wide range of wool fabrics to control shrinkage. According to numerous mill trials that have been run, the new process is applicable to an even wider range of fabrics with even more exact control. At the same time substantially less resin is needed to do the job.

One of the most important factors in the new process is that it requires absolutely no special high temperature equipment of any kind. All successful previous resin applications on wool called for a cure box to obtain the heat which was formerly essential for curing resin on the fabric. In the new process the ordinary drying equipment is entirely adequate. Thoroughly tested during the past year on a wide range of fabrics by runs at woolen mills, it has been demonstrated that the tensile strength of the fabric is not adversely affected.

The amount of resin required for shrinkage control with the new process is reduced by 30 to 50 per cent. A big advantage of the new process is that it does not dull even the most delicate shades, and the wash-fastness of all colors is improved. Clear white can also be obtained.

A pretreatment of the wool before dyeing and resin application has been found to be desirable in about 85 per cent of the cases.

Practical runs show that the normal equipment of mills, operated at normal speeds, is entirely satisfactory for application.



Plasticizer NP 919

Dioctyl phthalate-type plasticizer now produced by B. F. Goodrich Chemical Co.

The first Good-rite plasticizer to be marketed by B. F. Goodrich Chemical Co. is known as GP 261.

This dioctyl phthalate plasticizer is excellent for vinyl and other synthetic resins as well as for nitrile type rubber. It imparts such desirable properties as heat and light stability, permanent flexibility, low-temperature flexibility, resistance to hydrolysis, low water extraction and excellent electrical properties. These characteristics assure its successful use under many varied conditions for a wide range of applications.

Chemical Properties

Specific gravity @ 20° C	0.986
Boiling range @ 4 mm.	99% between 215-250° C
Freezing range	−50 to −55° F.; stiff gel
Odor	Moderate, characteristic
Refractive index	1.485

Phenolic Resins NP 920

Fast-curing phenolic molding powders developed by General Electric.

A new line of fast-curing phenolic molding powders which will enable plastics manufacturers to speed production

We need a Fatty Acid "tailored" for this job...

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Hardesty Fatty Acids can be made to fit your special specifications . . . not only on your first order but every reorder is meticulously checked to maintain the standards you require.

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Ester gum	Acrylic resins
Manila-copal	Polystyrene
Shellac	Alkyd resins
Cellulose acetate	Coumarone resins
Cellulose acetate-butyrate	Oil-soluble phenolic resins
Ethyl cellulose	Alcohol-soluble phenolic resins
Nitrocellulose	Urea-formaldehyde resins
Many vinyl chloride copolymers	Neoprene
Polyvinyl acetals	Thiokols
Polyvinyl butyral	Masticated rubber
Vinylidene chloride copolymers	Chlorinated rubber

USEFUL IN FABRIC COATINGS, SYNTHETIC FIBER MANUFACTURE, FILM CASTING, LACQUERS, ADHESIVES

Tetrahydrofuran is an outstanding solvent for many natural and synthetic resins, yielding solutions of unusually high solids contents at practical working viscosities. This solvent makes easy work of dissolving many hard-to-handle plastics, such as high molecular weight vinyl chloride and vinylidene chloride copolymers, whose uses have been restricted by the difficulty of getting them into solution.

SOLVENT FOR NONRESINOUS MATERIALS

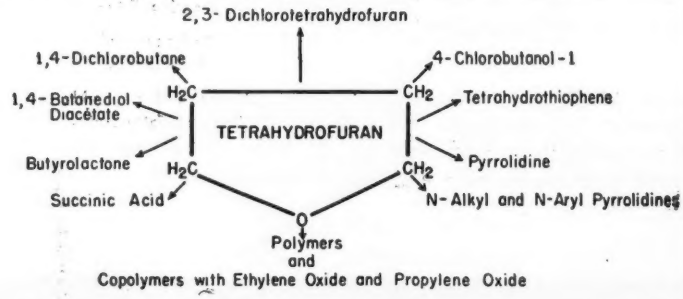
Tetrahydrofuran is miscible with water, drying oils, and practically all organic solvents. The extraordinarily wide range of nonresinous organic materials which it dissolves and its ether structure suggest its use as a reaction medium for chemical processes. For example, tetrahydrofuran is an excellent medium in which to carry out Grignard reactions.

PHYSICAL PROPERTIES

Appearance	Colorless, mobile liquid
Odor	Ether-like
Molecular Weight	72.10
Freezing Point	−108°C.
Boiling Point	65.4°C. at 760 mm.
Specific Gravity, 20/4	0.888
Index of Refraction, N20/D	1.4073
Flash Point	−20°C.
Vapor Pressure	
25°C.	176 mm.
45°C.	385 mm.
65°C.	760 mm.
Solubility	Miscible with water and most common organic solvents.

APPLICATIONS AS A CHEMICAL INTERMEDIATE

Chemical reactions of this compound are those of an aliphatic ether modified by its cyclic nature. A few of the reaction products are shown below to illustrate the versatility of tetrahydrofuran as a chemical intermediate.



A request on your company letterhead will bring a copy of Revised Technical Bulletin No. 4, price information, and also a sample if desired. Limited commercial quantities are presently available. E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Dept., Field Research Section, Wilmington 98, Delaware.

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Better Things for Better Living . . . Through Chemistry

and reduce material costs has been announced by the General Electric Company's Chemical Department.

Developed to make it possible to lower the cost of wiring device parts, these general purpose powders are available in special granulations for high speed automatic molding as well as in stock grades for conventional operations. Molders who have evaluated the materials are said to have realized production increases up to 25 per cent as a result of shorter curing times.

General Electric says the low specific gravity (1.37) of these new molding powders enables users to produce more parts per pound than is possible with higher - gravity fast - curing materials. Other physical and electrical properties are equal, it is claimed, to those found in typical general purpose compounds.

Sodium Trifluoroacetate NP 921

Fluorine compound suggested as intermediate now in pilot-plant production.

Pilot-plant production of sodium trifluoroacetate is being carried out by the Hooker Electrochemical Co.

The compound is in the form of a white, odorless, non-corrosive, free flowing powder. Its properties suggest the possibility of its application in the preparation of many useful chemicals such as herbicides, insecticides and dyestuffs. The salt is non-toxic and is 98 to 99% pure

Sodium trifluoroacetate is hygroscopic. When converted to the acid, as generally done for chemical processing, the acid is highly ionized.

Brush Control NP 922

Formulation of weed-killing chemicals eliminates brush growth at low cost.

A new chemical compound for brush control has been developed by the Agricultural Chemicals Division of The Sherwin-Williams Co.

The new discovery, a specially formulated alkyl ester combining 2,4-D and 2,4,5-T, is expected to see widespread use in reclaiming grazing land, along electric utility and telephone lines, railroad right-of-ways, on roadsides and around airports.

Called "Sherwilkil," the chemical mixes readily with water for convenient handling and has a highly lethal effect against poison ivy, poison oak, poison sumac and nearly 60 other types of woody plants that constitute 95 per cent of the brush control problem.

Sherwin-Williams research chemists say this new product makes it possible for the first time to eliminate brush at a low cost without continuous, heavy and repeated re-growth problems that accompany mechanical clearance. Too, the

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In addition to the three popular sizes in which Hooker Aluminum Chloride anhydrous has been available, it is now being supplied in an extra fine grind.

Now you can get this catalyst in the size which is most effective for your particular reaction.

- **EXTRA FINE GRIND**—An unscreened material, 90 to 95% passing 40 mesh.
- **FINE GRIND**—An unscreened material practically all passing 20 mesh.
- **COARSE GRIND**—An unscreened material 1 mesh and finer, containing 25% to 35% finer than 20 mesh.
- **COARSE SCREENED**—Same as coarse grind but screened to remove 20 mesh and finer.

All sizes are of the same high purity—particularly free from iron and other non sublimables—and every shipment conforms to exact Hooker specifications. For smooth reactions—in Friedel Crafts syntheses, polymerization, isomerization and halogenation—select Hooker Aluminum Chloride, Anhydrous.

HOOKER RESEARCH PRESENTS

SODIUM TRIFLUOROACETATE

CF_3COONa

Molecular wt. 136.02

Purity 98%

Hooker Sodium Trifluoroacetate, another in the growing list of Hooker fluoride derivatives, is a white, non-corrosive free flowing powder. It is very soluble in water, soluble in ethanol, methanol and methyl ethyl ketone, slightly soluble in ether and insoluble in benzene, carbon tetrachloride and perchloroethylene. It is resistant to hydrolysis, not being attacked by aqueous alkali at the boiling point. Physical and chemical properties of sodium trifluoroacetate indicate its use as an intermediate in the preparation of herbicides, insecticides and dyestuffs; as a condensing agent. For organic synthesis, sodium trifluoroacetate is generally converted to the acid and enters into many interesting and promising reactions.

Technical Data Sheet No. 377 gives additional physical and chemical characteristics and indicates typical reactions. It is available when requested on your business letterhead.

Research samples in the size you want, and Technical Data Sheet 714 will be sent when requested on your business letterhead.

Specifications:

HOOKER ALUMINUM CHLORIDE, ANHYDROUS

Appearance: Grayish crystalline solid.

ANALYSIS:

$AlCl_3$, Min.	98.5%
Fe, Max.	0.05%
Non-sublimables in air at 950°C, Max.	1.5%

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Cellulose Gum can be readily dissolved in either cold or hot water to form colloidal and highly viscous solutions, possessing marked suspending, thickening, stabilizing, and film-forming properties.

applications

CMC's versatility is utilized by many industries such as detergent, paper, textile, printing, pharmaceutical, cosmetic. Write for new book and test sample. If possible, specify type and grade.

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product has none of the disadvantages of poisonous sterilizing and contact chemicals and creates no fire hazard as is the case with some other non-mechanical methods employed in the past.

Successful brush clearance with "Sherwilkil" requires a program of an initial thorough spraying, followed by one treatment a year for one to three years, thereafter.

Many kinds of brush are killed with one application. Others will be defoliated, slowed in growth and injured by the first treatment. One or more repeat treatments of remaining live portions and sprout growths usually result in their elimination. A few species, such as pine, are highly resistant, but these usually do not cover much of the brush-infested area.

Each successive treatment requires progressively fewer man-hours and less material and total spray.

"Sherwilkil" is available in quart, one-gallon, five-gallon and 53-gallon containers.

Non-Ionic Detergent NP 923

Sharples introduces alkylene-oxide adduct types surface-active agent.

Nonic 218 is a concentrated, liquid, non-ionic surface active agent of the alkylene-oxide adduct type manufactured by Sharples Chemicals, Inc. It possesses an unusual combination of detergent and wetting properties. It is seldom necessary to use more than one part of Nonic 218 in 2,000 parts of solution. This concentration gives a Draves-Clarkson sinking time of less than 25 seconds at 77° F. and excellent detergency. Nonic 218 is effective over wide ranges of temperature and pH.

Its physical properties are:

Color.....Straw
Physical Form.....Liquid
Odor.....Very slight characteristic
Specific Gravity @ 20°/20° C.....1.05
Viscosity at 77° F.....1.33 poises
Average Weight per gallon.....8.5 lb.

Concentration for 25 second sinking time @ 77° F. by Draves-Clarkson..0.45%
Surface Tension of .05% solution...28 dynes/cm.
Interfacial Tension Water against Mineral Oil .05% solution.....0.0 dynes/cm.
Soluble in water, ethyl alcohol, acetone acetate, ethyl ether and amyl acetate.

Silicone Resin NP 924

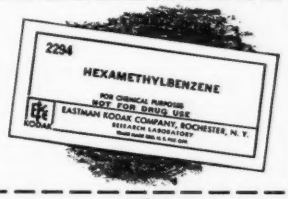
G.E.'s insulating resin fast-drying, designed for electrical parts.

A new silicone insulating resin designed to enable electrical equipment to operate at temperatures as high as 180°C has been announced by General Electric Company's Chemicals Division. Designated G-E silicone resin #9989-1, the tough thermosetting insulation has general application for impregnating spun glass and asbestos wire coverings and for binding coils, windings, and other motor, generator, and transformer parts.

G-E #9989-1 has excellent dielectric strength as well as superior heat and

Sometimes you need a Beakerful, not a Carload

Wondering what decomposition products you'd get from a gram of completely methylated benzene?



Speculating on the possible advantages of using a really pure solvent?

Considering the effect of a change in position of substituents in your process intermediate?

Trying to work out a reaction that starts from two bromines and a hydroxyl on three adjacent carbons?

Eastman maintains the world's most complete stock of organic compounds. Next time you need chemicals in laboratory quantities it will save you time and money to remember that.

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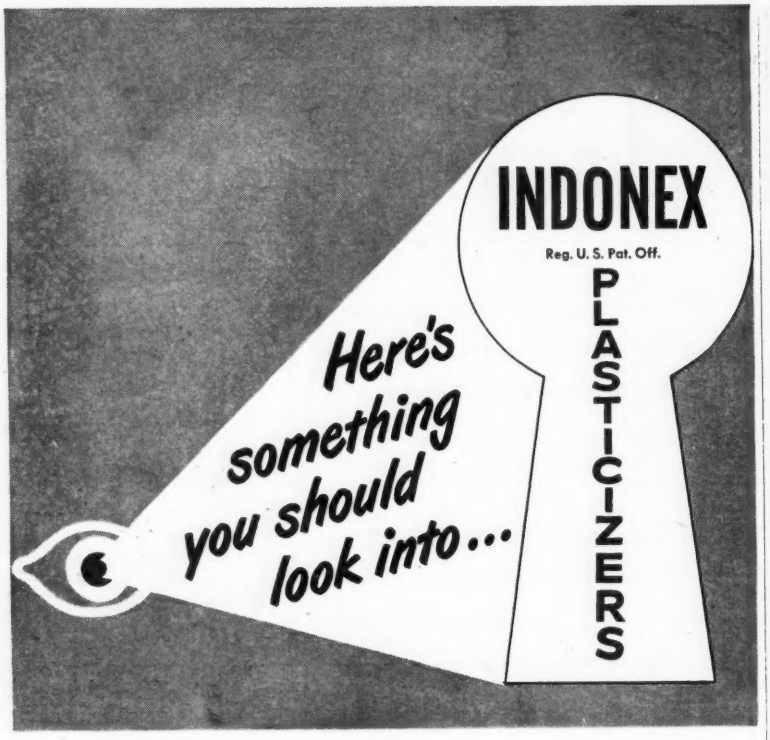

A versatile plasticizer, modifier, extender

ALL grades of INDONEX Plasticizers are compatible with a wide range of resins including various phenolics, modified phenolics, alkyds, acrylates, polyamides, cellulose derivatives, coal tar and petroleum resins, polystyrenes, rosin derivatives, and waxes. Many diverse applications as plasticizers, modifiers, or extenders are indicated. (Circular 105.)

INDONEX Plasticizers 633½, 634½, 638½ have found many applications in compounding of GR-S, Natural Rubber, Neoprene, Butyl and Acrylonitrile Copolymers. (Bulletin 13 and special circulars.)

Grade	633½	634½	638½
Color	Dark	Dark	Dark
Flash °F.	450	460	510
Pour °F.	35	40	70
Viscosity 210°F., Saybolt sec.	110	125	510
Evap. Loss mg/10g (1 hr. 100°C.)	5	5	3

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INDOIL CHEMICAL COMPANY

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water resistance. According to General Electric, it dries tack free in less than 30 minutes at relatively low temperature and can be cured to a tough flexible film.

General Electric stated that the new silicone resin can be cured in conventional equipment at baking temperatures ranging up to 250°C. It has a solids content of 60 per cent and an average viscosity of 200 cp at 25° C. The material can be used as supplied or can be thinned with petroleum spirits or VM & P naphtha.

Styrene Treatment NP 925

Improved Logoquant treatment easier to use, comes in colors.

A greatly improved form of the Logoquant treatment for polystyrene surfaces has been announced by Bee Chemical Co. The new Logoquant is available either as a clear material or with pigments providing a wide choice of colors.

The new material preserves the advantages gained through use of the original Logoquant, its makers say, but eliminates the characteristics that made the former product somewhat difficult to use. Surface hardness and brilliance have not been sacrificed, but new developments make the material very easy to spray with any conventional equipment. Sensitivity to humidity has been so greatly reduced, according to the announcement, that clouding does not occur under any ordinary conditions, and it is unnecessary to force dry the sprayed parts unless for production reasons. The improved Logoquant is not intended for application by dipping.

Battery Compound NP 926

Chemical formulation claimed to extend life of lead batteries.

Pioneers, Inc., are manufacturing AD-X2, a compound of chemicals which, when added to the electrolyte of lead-acid type storage batteries, is said to lengthen their life expectancy. It is also claimed to extend the life of mechanically-sound old batteries (usually discarded because of "sulfation") and to increase their capacity.

The material, AD-X2, is of particular value for batteries operating under severe conditions of high temperature, extreme overload and infrequent charging.

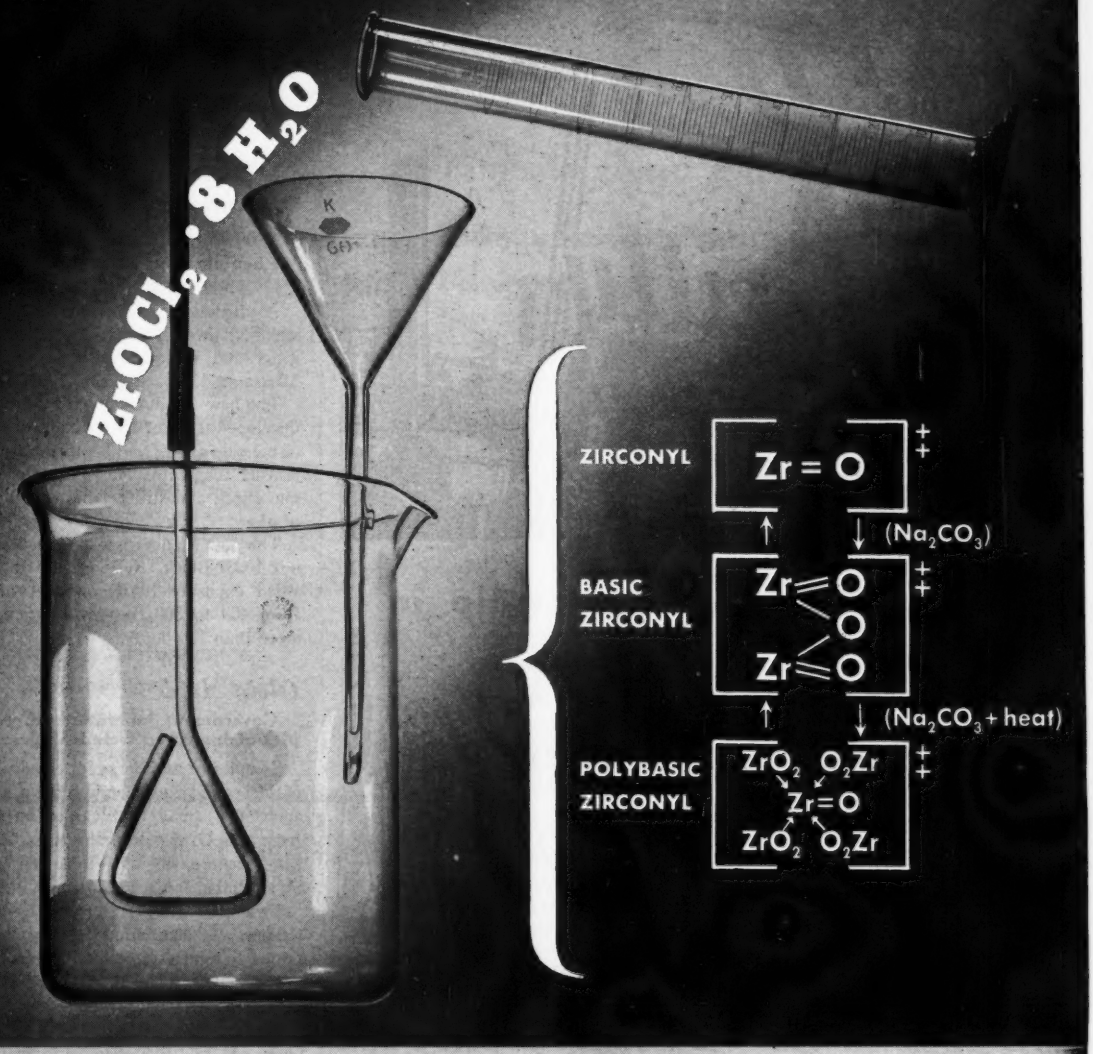
Floor Enamels NP 927

Pittsburgh Plate introduces rubber-base alkali-resistant floor enamels.

Alkali-resistant floor enamels have been added to the standard Pittsburgh Plate Glass Co. line of paints. The new products will be marketed under the Pittsburgh Finishing Material label and are now available in two colors, pewter gray and tile red.

The new enamels are rubber-base products for use on interior cement floors where conditions of dampness, moisture, alkali or a combination of these elements

UNUSUAL IONS WITH USEFUL APPLICATIONS



Upon dissolving zirconium oxychloride in water, a number of ionic individuals is obtained. The preponderance of particular ions can be easily controlled by adjusting the temperature and pH of the solution. This permits a surprising number of physical and chemical properties to be realized from this one zirconium salt. These properties have already been successfully exploited in the preparation of a wide variety of chemical products. Many additional uses are in prospect.

Manufacturers interested in better catalysts, mordants, pigment lakes and toners, leather tanning, pharmaceuticals and numerous other chemical products may obtain detailed information through our New York Office.

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Coal Tar Research and Development

• For nearly fifty years the organization embracing the Reilly Tar & Chemical Corporation has continuously increased the scope of its activities in the coal tar field. All of the regular coal tar chemicals of importance to industry have long been produced by Reilly. As a result of the continued program of expansion in research and development facilities many new materials have been made available to industry, and today Reilly offers a diversity of coal tar products not equalled by any other producer.

Listed here are a few of the high purity, refined coal tar acids, hydrocarbons and bases that are available through the twenty-four Reilly sales offices, located in the principal industrial cities.

ACIDS: m-Cresol, o-Cresol, p-Cresol, m-Ethylphenol, 1,3,5-Methylethylphenol, Phenol, 1,2,4-Xylenol, 1,3,4-Xylenol, 1,3,5-Xylenol, 1,4,2-Xylenol.

HYDROCARBONS: Acenaphthene, Anthracene, Chrysene, Dimethylnaphthalenes, Fluoranthene, Fluorene, Methylnaphthalenes, 1-Methylnaphthalene, 2-Methylnaphthalene, Naphthalene, Phenanthrene, Pyrene, Diphenylene Oxide.

BASES: 2-Aminopyridine, 2-Amylpyridine, 2-Amino-3-Methylpyridine, 2-Amino-4-Methylpyridine, 2-Amino-5-Methylpyridine, 2-Amino-6-Methylpyridine, 2,6-Diaminopyridine, 4-Amylpyridine, 2-Dipyridylethyl Sulfide, 2-Ethanolpyridine, N-Ethylcarbazole, 2-Hexylpyridines, Isoquinoline, Lepidine, 2,6-Lutidine, 3-Methylisoquinoline, 2-(5-Nonyl) Pyridine, 4-(5-Nonyl) Pyridine, Alpha Picoline, Beta Picoline, Gamma Picoline, 2-Mercaptoethylpyridine, 2-Propanolpyridine, Pyridine, Quinaldine, Quinoline, 2-Vinylpyridine, Carbazole.

Information on any of these materials, or any other coal tar products, will be gladly furnished on request.

REILLY TAR & CHEMICAL CORPORATION

MERCHANTS BANK BUILDING, INDIANAPOLIS 4, INDIANA

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are usually severe. They are specifically recommended for use on areas located near chemical tanks, bottling machines, etc., where exposure conditions are often abnormal.

A companion product, a solvent reducer, is also being introduced by Pittsburgh Plate for removing wax and grease from areas prior to painting with the enamel. The solvent reducer may be used as a thinner for rubber-base enamels and for cleaning brushes or spray equipment used in their application.

Phenolic Molding Powder NP 928

Phenolic resin withstands heat shock, retains high gloss.

A phenolic molding powder with outstanding heat resistance and improved gloss and surface finish is offered by Monsanto Chemical Co.

The new Resinox molding powder was developed to meet the demand of molders of utensil handles and knobs for a phenolic powder that withstands extremes of thermal shock and still retains a high degree of gloss.

The new product is catalogued as Resinox 10231 Black. Resinox 10231 has withstood exposure to temperatures ranging from 400 to 500 degrees Fahrenheit for more than 100 hours.

Oleic Acid

Government laboratory offers samples of improved technical oleic acid.

Samples of an improved technical grade of oleic acid (minimum content of oleic acid, 90%) may be obtained on request from the U. S. Department of Agriculture, Eastern Regional Research Laboratory, Philadelphia 18, Penna.

This oleic acid is prepared by crystallization and distillation of fatty acids obtained from selectively hydrogenated animal fats, and contains some monounsaturated C_{18} acids other than cis-Δ^9-octadecenoic acid.[1,2] As distinguished from red oil, this oleic acid is characterized by its low content of polyunsaturated acids, and therefore has improved resistance to oxidative deterioration, and superior color and odor stability. It has the following characteristics:

Oleic acid content	90% (minimum)
Polyunsaturated acid content	4% (maximum)
Iodine number	88-91
Melting point	14-20°C
Color	Pale yellow
Acid number	198-201
Neutralization equivalent	279-283
Mackay test (one hour)	101°C

This product is recommended for evaluation where its special characteristics are important, such as for chemical syntheses, in the preparation of textile lubricants and finishing agents, and in cosmetics.

[1] Swern and Scanlan, Paper presented at American Oil Chemists' Society Meeting, Chicago, Ill., Oct. 27, 1944; Oil and Soap 23, 128 (1946).

[2] Swern and Ault, U. S. Patent No. 2,457,611 (1948).

Manufacturers of Fine Organic Chemicals

for Soaps, Perfumes, Drugs, Pharmaceuticals, Plastics, Cosmetics, Denaturing, Insecticides, Fumigation and other purposes.

AROMATIC CHEMICALS

Phenyl Ethyl Alcohol
Phenyl Ethyl Acetate
Ethyl Phenyl Acetate
Benzyl Acetate
Benzyl Alcohol
Benzyl Benzoate
Alpha Amyl Cinnamic Aldehyde
Acetophenone
Methyl Acetophenone
Benzophenone
Nerolin
Yara Yara

COAL TAR CHEMICALS

Cresylic Acid
Tar Acid Oil
High Boiling Tar Acids
Ortho-Cresol
Pyridine

FUMIGANTS

Methyl Formate
Ethyl Formate

PHARMACEUTICALS and INTERMEDIATES

Cyanoacetamide
Cyanoacetic Acid
Ethyl Cyanoacetate
Methyl Cyanoacetate
Triethyl Orthoformate
Phenyl Acetic Acid
Phenyl Acetamide
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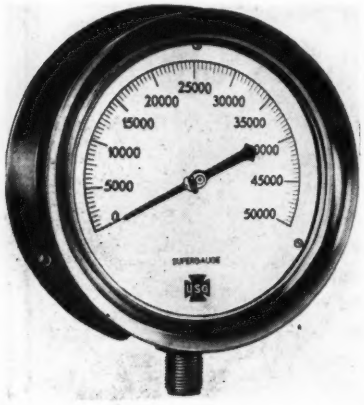
NEW EQUIPMENT

Pressure Gauge QB795

A solid wall, cast integral with the case, separates the Bourdon tube and movement section from the observer, and the back of the case is fitted with a spring mounted safety release.

The new gauge, manufactured by the U. S. Gauge Division of American Machine and Metals, Inc., is designed for testing high pressure gases and liquids at



extreme pressures. In the event of a Bourdon tube rupture, the safety release plate on the back of the gauge will momentarily discharge the high pressure media away from the observer.

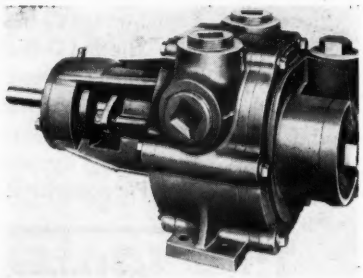
Bourdon tubes are made of specially selected beryllium copper or stainless steel and are threaded at both ends with specially cut full threads for interference fit. These springs are then attached to the threaded socket and tip and sealed against a specially designed cone (made of extremely hard stainless steel, stoned and polished to a high finish). Being harder than both the spring and the socket, this cone imparts its smooth finish to both spring, tip and socket effecting a tight seal at these high pressures.

These gauges have deep bushed, stainless steel geared movements of high ratio. Accuracy is 1% of full scale reading on all pressures up to 50,000 psi and 2% of full scale reading on all pressures of 60,000 psi and over.

Pump QB796

A new heavy duty Tri-Rotor pump for handling non-lubricating materials has been designed by The Yale & Towne Mfg. Co., Stamford Div.

The new model Tri-Rotor pump is especially applicable for handling such materials as aviation gasoline, naphtha, solvents and similar fluids, at differential pressures of 50 psi and under. It may be equipped with solid, by-pass or variable



volume control type heads. All heads are interchangeable. These heavy duty units are supplied with either iron or bronze fitted pumping members.

The new models are equipped with a Timken double roller combination radial and thrust bearing, which is integral with the shaft housing. This feature permits locating and holding the rotor group (pumping members) in position against internal and external forces.

The pump casing of the new model is of cast iron construction. The new pump is available in three different sizes:

2″ — 80 gpm
2½″— 90 gpm
3″ —100 gpm

Temperature Transmitter QB797

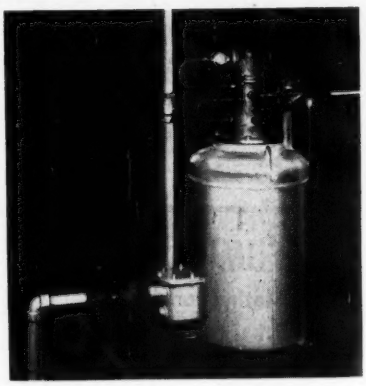
A new force-balance type pneumatic temperature transmitter, the Transaire with Speed-Act, is available from the Taylor Instrument Cos.

This new instrument is designed particularly for applications where it is desirable to have the indication, record or control remotely located from the point of measurement and where it is necessary to have accuracy, high speed of response, small thermal elements and short range spans within the limits of —375° and +1000°F.

An outstanding feature is the incorporation of Speed-Act which applies the principles of derivative action directly to temperature determination. This overcomes the lag inherently present in the response of any form of thermal measuring element.

Employing advanced force-balance principles, its output in psi is proportional to the temperature of its thermal element, and by means of ¼″ O.D. copper tubing, this pressure change can be transmitted to a recording or controlling receiver located as far as 1000′ away.

• QB798 The new Schutte and Koerting *Ejectopump* operates by means of compressed air from 30-50 psi and handles many liquids without aeration at temperatures up to 120° F. and higher depending



on lift. Pumps have a maximum suction lift of 25 ft., as well as discharge heads up to 55 ft.

The Ejectopump uses no impellers or rams, and the liquid being handled is not violently agitated or stirred. With this pump, no lubrication is required. Gritty and corrosive matter can be pumped without damage to the equipment as there are *no glands* and *no bearings*. By use of special suction and discharge valves, even suspended or included solids—of considerable size—can be pumped. The pump

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CHEMICAL INDUSTRIES, 309 W. Jackson Blvd., Chicago 6, Ill. (6-9)

Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

QB795	QB800	QB803a	QB807	LE132
QB796	QB801	QB804	QB808	LE133
QB797	QB802	QB805	QB809	LE134
QB798	QB803	QB806	LE131	LE135
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Bemis Waterproof Laminated Textile Bags are extra strong, and they're specially constructed to guard against:

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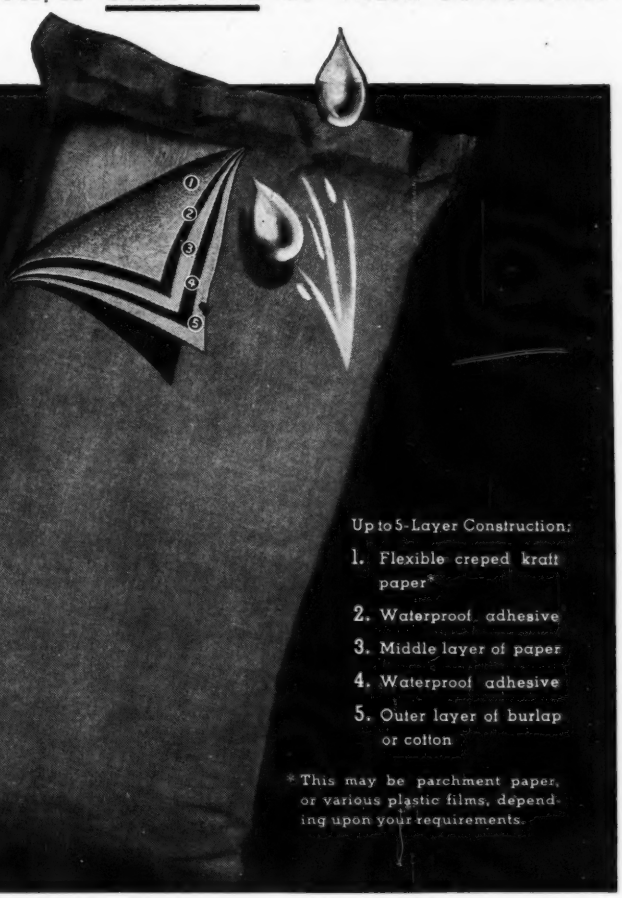
- Undesirable odors
- Insect infestation
- Loss of aroma



Up to 5-Layer Construction:

1. Flexible creped kraft paper*
2. Waterproof adhesive
3. Middle layer of paper
4. Waterproof adhesive
5. Outer layer of burlap or cotton

* This may be parchment paper, or various plastic films, depending upon your requirements.

If you have a "hard-to-pack" product or one that must stand the rough handling of l.c.l., truck, or export shipment, it will pay you to investigate the advantages of Bemis Waterproof Bags.

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LOOK WHAT'S HAPPENING
on the Texas Coast

ASBESTOS CO. ADDS SILICA MILL

Construction has just been completed in Houston on a $125,000 unit for the Asbestos Company of Texas to manufacture ground silica sand. Test runs have been completed, and production has now reached a daily output of 75 tons or one and a half carloads. About half the production will be absorbed by the company itself in the manufacture of its Mustang Brand shingles and siding. The balance will go to foundries, paint manufacturers.

FAMOUS NAME MOVES TO ROBSTOWN

Under the name of Agricultural Chemicals, the Sherwin Williams Company has recently started operation of a new blending plant at Robstown. Located on a 5-acre tract, the new plant is turning out about 12,000 lbs. of cotton and vegetable insecticides daily.

TALL TALE... BUT TRUE

On many Texas ranches you can ride from sun-up to sun-down without getting from the front gate to the back. Those are just the medium sized ranches. Some of them really get big, like the ranch of the late W. T. Waggoner, reputed to have been the richest man West of the Mississippi in his day. This story proves the point. Two farmers were talking when one of them mentioned a certain county. "Where's that?" asked the second farmer. "Oh," answered the first nonchalantly, "It's one of the counties on Tom Waggoner's ranch."

A CHEMICAL EMPIRE A-BUILDING

That's the Texas Gulf Coast. Check the names that have established here: Dow, Monsanto, Shell, duPont, Carbide and Carbon Chemicals, to name a very few. Check the products made here: heavy, industrial chemicals; synthetic rubber; alcohol; glycerine; solvents; fertilizers and plastics, to start the list. Check the advantages this region offers you unlimited quantities of acids, bases, sulphur and fresh water, AND NATURAL GAS for hydro-carbons; good reasons why your industry can profitably FOLLOW THE TREND TO TEXAS.

☆ ☆ ☆

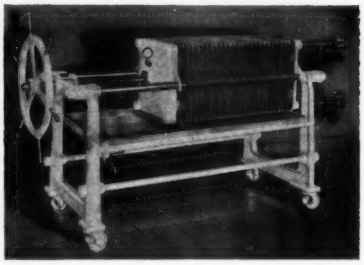
To help you find out more about the area we serve, we will gladly: (a) make a survey engineered to your company's needs; (b) supply you with any special information you require; (c) show you the coast country from Orange to Corpus Christi—all in strictest confidence. Write, wire or telephone Houston Pipe Line Company, Houston, Texas.

HOUSTON PIPE LINE CO.
Subsidiary of Houston Oil Company of Texas
GEO. A. HILL JR., President
Wholesalers of Natural GAS

is self-priming and includes an arrangement for blowing down the whole apparatus.

Operation of the SK Ejectopump is entirely pneumatic, and a rhythmic cycle of suction and discharge is maintained automatically. An air operated ejector in the pump head creates a vacuum throughout the pump and draws the liquid into the case. When the pump case is nearly full, the ejector shuts off, and the flow of air is diverted into the pump case. The liquid is discharged by displacement through the delivery pipe non-return valve. Before the pump case is entirely empty, the cycle is repeated.

• QB799 Ertel Engineering Corp. has developed a new *hard rubber disk filter*, Model EUR. It provides a complete circulatory passage of hard rubber and



therefore prevents liquids from being spoiled by metallic pickup.

Model EUR is available in sizes from a 10 disk model having 2350 square inches of filtering surface to a 100 disk model having 23,500 square inches of filtering surface. Sheet size is identical to that used in similar bronze or stainless steel filters—16" x 16" square.

Filtration capacities based on viscosity of water and filter sheet density, range from 5 to 50 g.p.m.

• QB800 The Atlas Valve Co. is now announcing an improved *high pressure reducing valve* for working pressures as high as 6,000 psi, Type E.

It is recommended for reducing the pressure of water, oil, and compressed air—in a single stage to 250 psi or to within 20% of the initial pressure. For lower reduced pressures the reduction should be made in two stages, the first stage through this Type "E" and the second stage through a valve for handling working pressures up to 300 psi. The body of this Type "E" valve is forged steel. The internal metal parts are entirely of hard chromium plated stainless steel.

• QB801 A new series of all-stainless or all-Inconel Chromalox *electric immersion heaters* is available from the Edwin L. Wiegand Co. These heaters are constructed of hair-pin shaped heavy duty Chromalox tubular elements welded into a solid screw-plug with 2-inch standard pipe thread and a heavy 3-inch hex section. The heating elements are die-pressed to a patented triangular cross-section to obtain high mechanical strength and a more dense refractory. This affords a better electrical insulation between the sheath and the resistor wire, and results in a maximum degree of heat transfer.

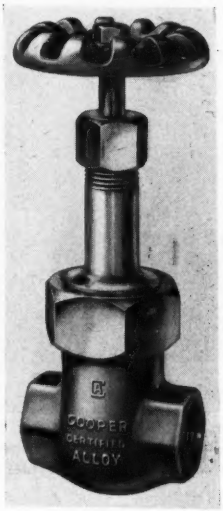
Heating elements, screw-plug, and welded joints are all made of the same alloy—type 347 18-8Cb stabilized stainless steel, or nickel-chrome Inconel.

The heated length of the element ranges from 12 to 50 inches. The heaters are normally used in water-type solutions, and are derated for use in more viscous liquids. Ratings from 1 Kw. to 15 Kw. are available in voltages of 230, 460, and 550, single phase.

• QB802 Known as Coromat, the new *pipe wrap* produced by Owens-Corning Fiberglas Corp. is a porous mat of glass fibers reinforced with long, continuous strands of glass yarns for covering underground pipelines. By incorporating the high-strength yarns in a multi-directional pattern, the tear strength of the basic Fiberglas pipe wrap has been increased 2-400%.

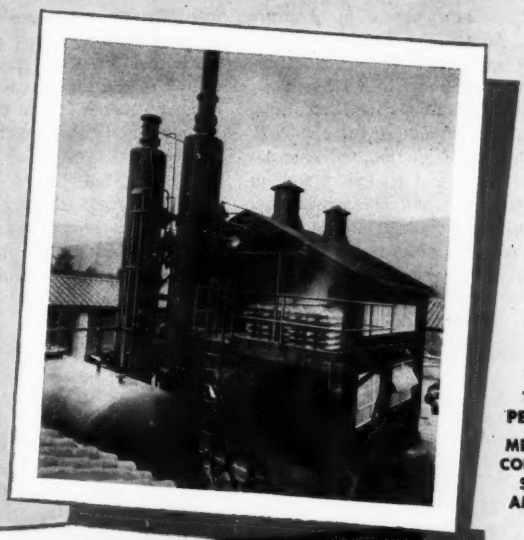
The high tear strength of the Coromat pipe wrap permits application at high speeds without the time-consuming delays caused by breakage of the wrap.

• QB803 A new compact *stainless steel union bonnet gate valve* has been developed by The Cooper Alloy Foundry Co.



Construction features include union bonnet design for long service life and simplified maintenance, ball and socket point contact discs which adjust themselves in any position, and a minimum of six turns of packing to assure effective sealing. It is available in various stainless alloys, in sizes ½", ¾", and 1".

How Much Sulfuric Acid *Do You Want To Produce?*



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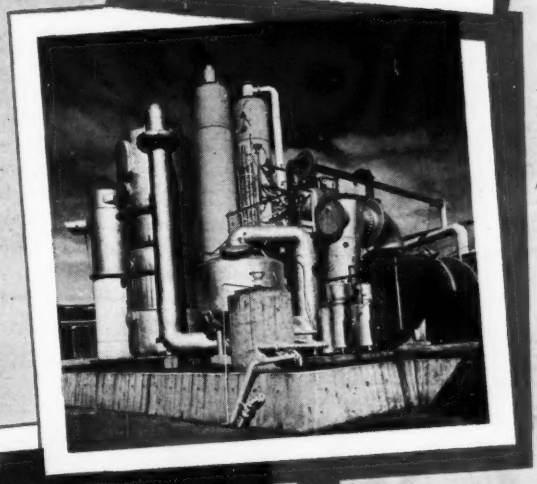
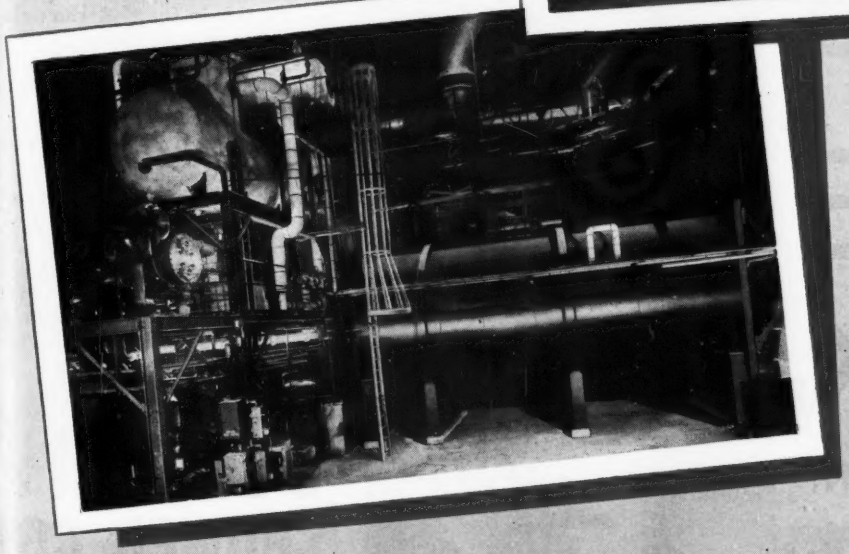
5 tons per day? 500 tons? Something in between? Whatever your sulfuric acid requirements, Chemico will design and furnish you with a plant tailor-made to fit your needs.

Chemico takes complete responsibility . . . turns over a highly efficient contact sulfuric acid plant on a one-contract, guaranteed-performance basis. Write for full information.



25 TONS PER DAY
HONOLULU, HAWAII



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CHEMICO CHEMICAL CONSTRUCTION CORP.

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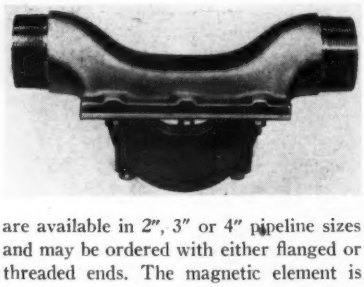
• QB803a F. R. Hormann and Co. has introduced a new series of *pressure sterilizing filters,* the Sanitype filters. They are primarily for clarification, polishing and sterilization of all types of pharmaceutical solutions and medicinal preparations. Advantages of Sanitype filters include: All internal and external surfaces of plates and frames coming in contact with the liquid are smooth and highly polished, elimination of unnecessary threads, welds, cracks or joints facilitates cleaning and eliminates contamination and flexibility for double or triple filtration is obtained within the same unit by the addition of one or two bypass plates.

• QB804 A new permanent *non-electric magnetic separator,* for removal of tramp iron from liquids conveyed in pipelines is available from the Eriez Mfg. Co. They



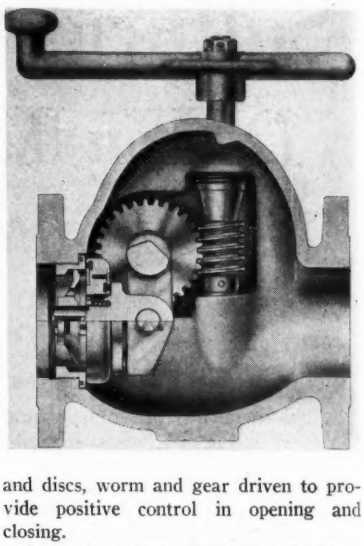
are available in 2″, 3″ or 4″ pipeline sizes and may be ordered with either flanged or threaded ends. The magnetic element is made up of one or more "U" shaped Alnico magnets permanently attached to a fused stainless steel face plate. This gasketed pressure tight plate is simply attached to the "trap" casting, creating a magnetic barrier in that particular section of pipe. It will accommodate pressures up to 75 psi.

• QB805 Ansul Chemical Co. has developed an all-*stainless steel valve* for mixing liquid or gaseous sulfur dioxide and water. It is suitable for any application where a continuous supply of a sulfur dioxide-

water mixture is desired. With proper auxiliary equipment, specific concentrations are easily maintained.

Water inlet and outlet on this #317 stainless steel valve are standard 1″ pipe thread. The sulfur dioxide inlet is ¼″ pipe thread.

• QB806 Tork-Master Company, Inc. is now producing the new MacBain "Positive Shut-Off" *valve.* Basically it is a check valve with main and primary seats

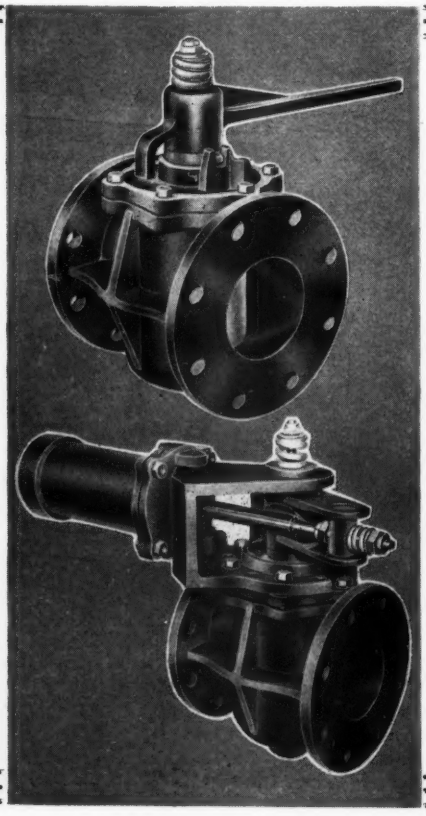


and discs, worm and gear driven to provide positive control in opening and closing.

Other important features include a double seal disc and seats which allow the

STOP LINE LEAK

WITH THE RESILIENT RUBBER-FACED PLUG IN DeZURIK VALVES



GAS OR AIR just can't get by . . . solids in the flow can't clog the closure . . . ANY LINE is sealed TIGHT against ANY LEAKAGE when you close a DeZurik Valve on it.

DeZURIK EASY-OPERATING PLUG VALVES are notable for two reasons: Their rubber-faced, metal-cored plugs shut DEAD TIGHT without any stretch, pinch or distortion; their ECCENTRIC DESIGN makes them open or close with only a quarter-turn and without any hint of friction, binding or seizing.

Write for Catalog No. 49

DeZURIK SHOWER CO.

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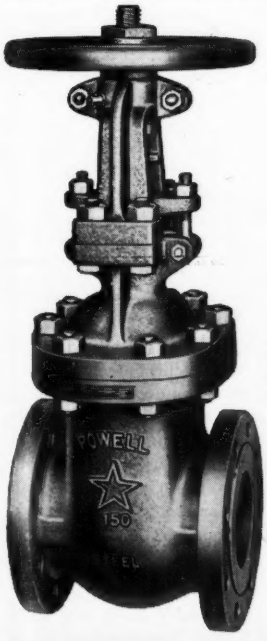
VALVE ACTION PERFECT!
Naturally - they're all
POWELL VALVES

Faulty valve performance can be as serious in the industrial plant as it is in the human heart.

Today, many plants throughout the United States have eliminated valve trouble by standardizing on Powell Valves. That's because, in designing *every* valve in the complete Powell Line, maximum performance at a minimum cost of maintenance has been a prime consideration. Also, because there's a Powell Valve specifically adapted to every known flow control requirement, failures due to misapplication are avoided.

So, whether you're making a new installation or need replacements, be sure to specify Powell Valves. And remember Powell Engineering Service is always at your disposal in selecting the correct valves to meet your individual requirements.



← **Fig. 1503**—Class 150-pound Cast Steel Gate Valve with flanged ends, bolted flanged yoke, outside screw rising stem, tapered solid wedge.

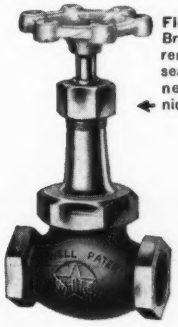


Fig. 1708 — 200-pound Bronze Globe Valve with renewable stainless steel seat and regrindable, renewable "Powellium" nickel-bronze disc. ←

Bellows Sealed "Y" Valve. Powell's Bellows Sealed Valves—Globe and "Y" patterns—are designed for high vacuum service and for installations where packing is unsatisfactory or fails frequently. The bellows is enclosed within the valve body, completely sealing the interior of the valve from the outside atmosphere. Available in 18-8S, 18-8S Mo., Monel Metal, Hastelloy, in sizes ¼" to 12", inclusive.

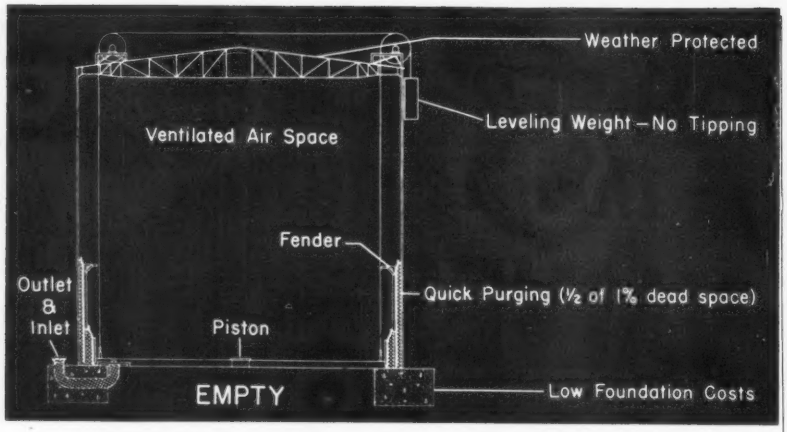
Fig. 1793 — Large 125-pound Iron Body Bronze Mounted Gate Valve. Made in sizes 2" to 30", incl. Has outside screw rising stem, bolted flanged yoke, tapered solid wedge.

Powell Valves are made in Bronze, Iron, Steel and a wide selection of Corrosion-Resistant metals and alloys. Valves of every type—Globe, Angle, Gate, Check, Non-return and Flush Bottom Tank Valves—are included in the Complete Powell Line.

The Wm. Powell Co., Cincinnati 22, Ohio

DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

POWELL VALVES



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NO OPERATING EXPENSE
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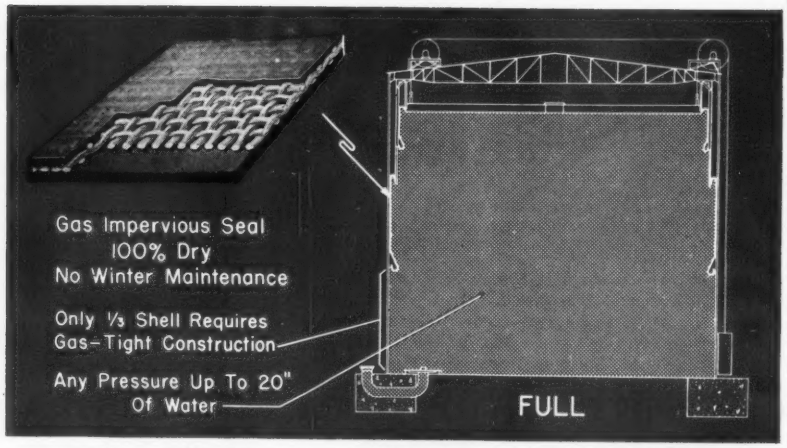

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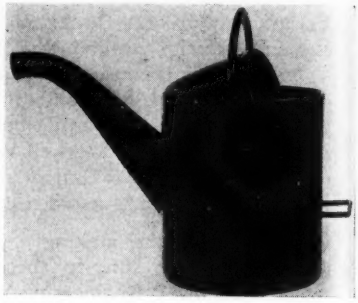
operator to throttle or close the valve without shock. Special synthetic rubber seals "positively" seal tight and stay tight under extreme conditions. Temperature ranges are from —40°F. to 300°F. Loss in head is reduced to a minimum with straight thru ports. A side access door allows inspection and reconditioning to be made without removing the valve from the line.

Valves are available from warehouse stocks in 2", 3" and 4" sizes for 150 and 300 psi.

• QB807 A new type unbreakable *safety container for handling acids* is available from Automotive Rubber Company, Inc. Equipped with a long 14" spout with curved neck that rests securely on the



edge of the tank, the design provides for safe pouring of acids where a reaction is expected.

The new container is constructed of perforated steel with all seams welded. It is completely covered, inside and out and including handles, with ⅛" tough, seamless, semi-hard rubber. The inner and outer coatings are wedded through the perforations in the metal to assure permanent adhesion.

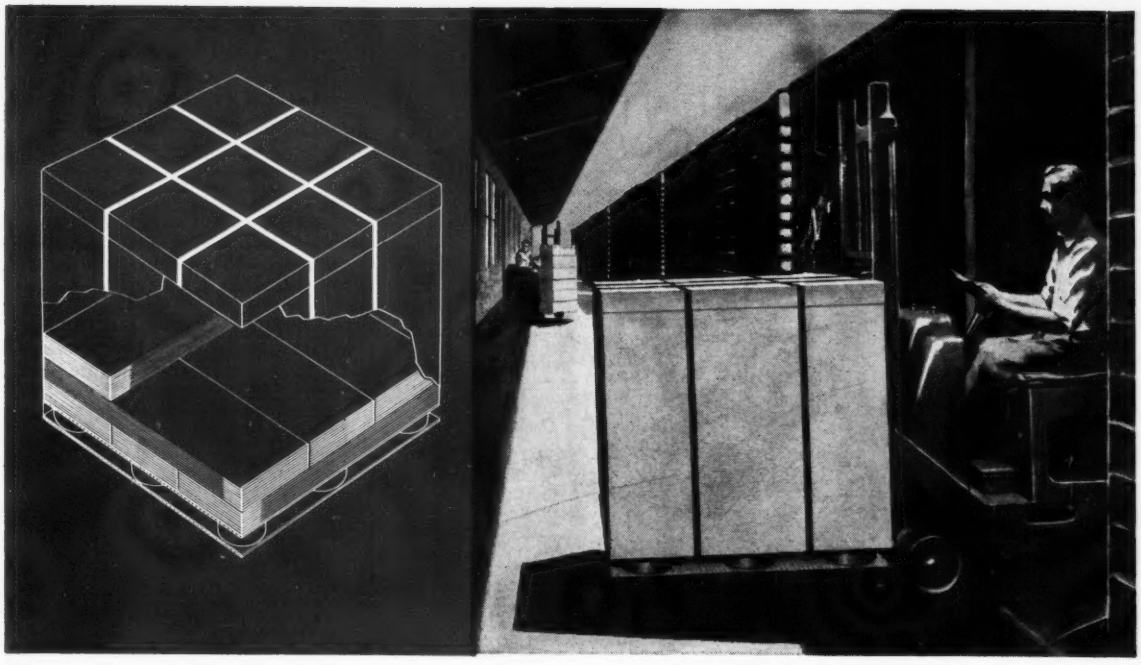
At present it is offered as standard in the five gallon size.

• QB808 The new Stokes self-contained *freeze dryer*, Model 2004-L, has 12 square feet of shelf area. It is designed for research and development technicians in hospitals, universities and industry. Any type of product, in bulk or in containers, can be handled.

One compressor is used for both prefreezing and condensation instead of the usual two compressors, simplifying installation, operation and servicing. Neither dry ice nor a desiccant is required.

• QB809 A new *midget-size mill* which grinds, emulsifies, homogenizes, mixes, disperses and disintegrates has just been developed by Morehouse Industries.

The new mill, designed for custom runs and laboratory testing measures only 10" in width and 31½" in height and weighs only 135 lbs. It is based on the same high production principle that has typified the larger type Morehouse mills.



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ONE of the hidden costs in packaging is in the handling of packaging materials from unloading dock to warehouse to packaging assembly line.

Thanks to new ways of shipping and handling, many firms now find savings in handling costs alone more than justify a switch to Union Multiwall Bags. The Union Multiwall Specialist who calls on you, can tell you all about the recent cost-cutting developments in handling of multiwall bags.

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BECKMAN pH METERS

MODEL G
for Precise Laboratory Measurements

No. 9680

The Beckman Model G pH Meter is industry's most widely recognized instrument for precise pH measurement. Simplicity, ease and rapidity of operation, versatility and accuracy characterize the Model G.

Units of pH from 0 to 13 can be read directly from the scale with a sensitivity of 0.01 and reproducibility of 0.02 pH unit. Built-in temperature compensation covers range 10° to 40°C. Measurements can be made at a distance from the meter and many accessories and electrodes are applicable for special purposes.

9680—BECKMAN pH METER, MODEL G. With 2½" Glass-Calomel Electrode Assembly, buffer and KCl solutions. Ready to operate. Complete with Batteries $245.00

MODEL H-2 METER for Industrial Quality Control

The Beckman Model H-2 pH Meter combines the twin advantages of operating simplicity and freedom from battery replacement. Simplified operating instructions are engraved on front panel. It provides temperature compensation and operates on 115 volt, 50-60 cycle A.C.

The Beckman Model H-2 is especially suited to routine pH measurements over the range 0 to 14 pH permitting direct readings with an accuracy of ± 0.03 pH.

9681—BECKMAN pH METER, MODEL H-2. With 5" Glass and Calomel Electrodes, Buffer and KCl solutions, ready to operate. For 115 volt 50/60 Cyc. A.C. . . $195.00

Both Beckman Models G and H-2 pH Meters are useful for titrations, oxidation-reduction potentials and Karl Fischer moisture determination.

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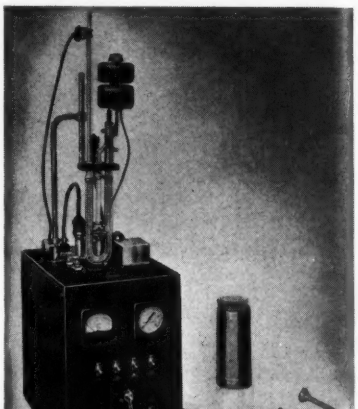
LABORATORY EQUIPMENT

Cryoscope LE131

The molecular weight of liquids and solids can be determined quickly and accurately with a new laboratory apparatus developed by Precision Scientific Co.

The new "Precision" cryoscopic molecular weight apparatus was produced in cooperation with the Shell Development Co. to determine the molecular weight of



liquids or solids by the freezing-point method. It can also be used for rapid determination of the freezing-point of liquids or for determining cooling curves of liquids.

The apparatus is extremely simple. There is no separate insulated air jacket, or ice bath to set up; controls for tube heat, vacuum, tube motor, venting, dry air, and cooling are at the finger tips of the operator. In addition, there is a milliammeter and a gage indicating inches of water pressure.

For determining molecular weight according to the latest A.S.T.M. D852 method, the operator plugs the apparatus into a 115 volt line and adds ice to the Dewar flask. He then determines the freezing point of an accurately weighed amount of liquid whose molecular weight is known. In this liquid, a definite amount of material of unknown molecular weight is dissolved, and the freezing point lowering is noted. The freezing point lowering is directly proportional to the molecular weight.

• LE132 The New York Laboratory Supply Co., Inc., is now producing an *instrument* for the Karl Fischer-Oxidation-Reduction-Acid Base and Precipitation methods, the Nylab Titrator. The Titrator stand has built-in magnetic stirring with the activating magnet within the beaker

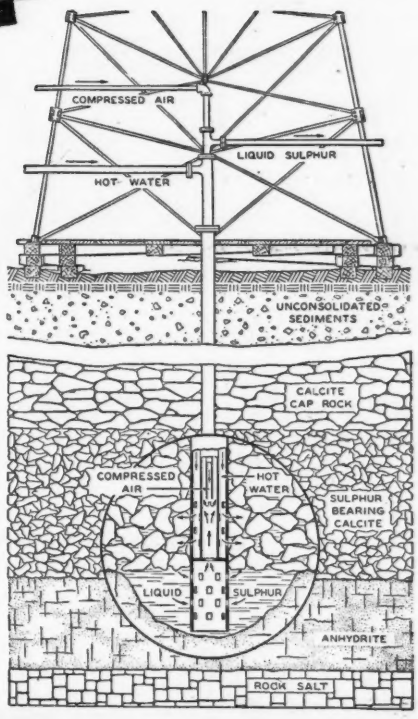
SULPHUR

*Interesting Facts Concerning This Basic Raw Material from the Gulf Coast Region

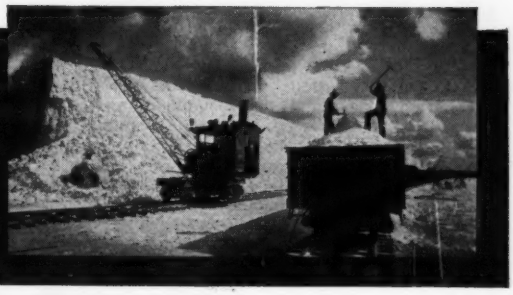
*WELL PIPING

The well equipment consists of pipes of various sizes, placed one within the other and extending from the surface into the sulphur deposit. A 10" or an 8" casing extends to and rests on the top of the cap rock. A 6" pipe, inside the casing, passes below it and reaches into the barren anhydrite. It is perforated at two different levels, separated by an annular collar. The upper set of perforations permits the hot water to enter the sulphur formation and the lower set permits the entrance of the molten sulphur to the discharge pipe fitted inside the 6" pipe.

When a well is "steamed" the hot water passes down the annular space inside the 6" pipe and outside the sulphur pipe and flows through the upper set of perforations into the porous formation. The entire mass through which the hot water circulates is raised to a temperature above the melting point of sulphur. The liquid sulphur being heavier than water, makes its way downward to form a pool and displaces water around the foot of the well, and rises in the well column through the lower perforations into a 3" pipe which is the sulphur discharge pipe. Compressed air released at the bottom of still another pipe fitted inside the 3" pipe rises and mixes with the sulphur column, forming an air lift which raises the liquid sulphur free of water to the surface.



Loading operations at one of the huge vats of Sulphur at our Newgulf, Texas mine. Such mountains of Sulphur are constantly being built at our mines, from which shipments are continually made.



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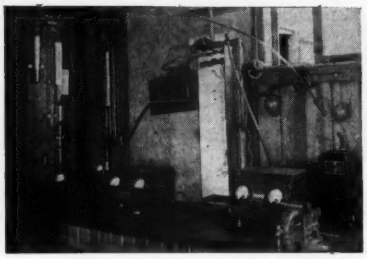
INC.

75 East 45th St. New York 17, N. Y.

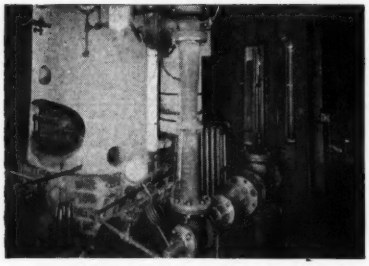
Mines: Newgulf and Moss Bluff, Texas

What's Behind a C-R Evactor?

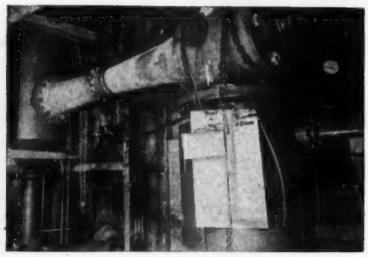
The production of Evactors is no routine operation at the Croll-Reynolds plant. Although C-R engineers have over thirty years of industrial vacuum experience to guide them, the Croll-Reynolds testing and development department is one of the important units of the company. Development work is constantly under way to improve the efficiency of Croll-Reynolds Evactors wherever it is possible. It is this never-ending research and development which give C-R Evactors their exceptional efficiency.



1. Instruments in the C-R laboratory set up for measuring extremely high vacuum.



2. Special boiler in the C-R pilot plant for providing unusual conditions of high pressure steam or superheat (or both) to duplicate the working conditions in customers' plants.



3. A 30-inch C-R Booster Evactor on test in a C-R shop.

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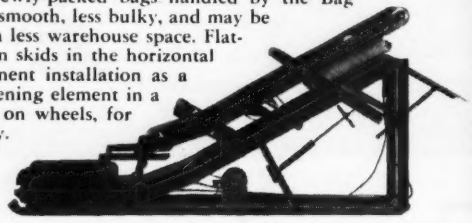

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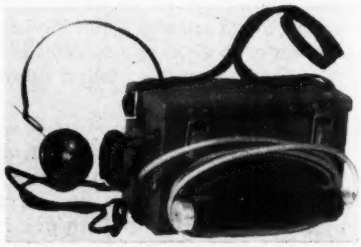
support. The driving motor is mounted inside the base of the stand.

A line-operated, continuously-reading dual purpose meter is supplied with the Titrator, having separate circuits and controls for the pH and the titration sections to be used concurrently for pH and titration work. Continuous sensitivity control and transposibility of scale readings permit use with all types of electrometric titrations. Provision is made for obtaining polarized electrode systems, which have been found to be advantageous in titrations such as the Karl Fischer water determination.

The Nylab Titrator operates from 115 volts, 50-60 cycles power supply only.

• LE133 The Nuclear Development Laboratory is presenting a low cost midget portable *radioactivity detector.* This new detector (Model PRD1) has been made possible by a compact electronic scaling circuit which automatically adds up pulses



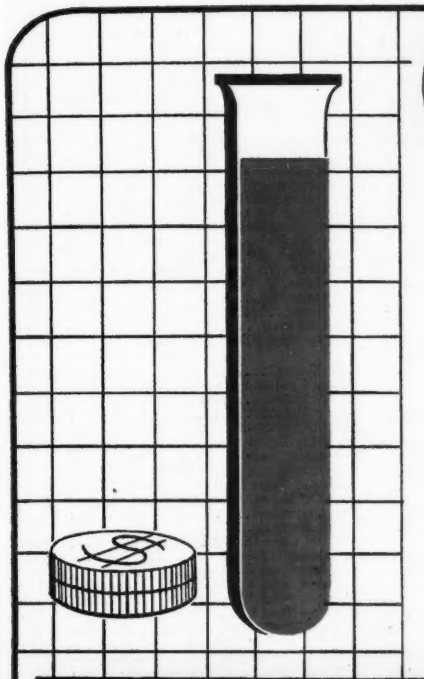
from a large beta and gamma ray sensitive Geiger-Mueller Counter tube.

The maximum radiation intensity accurately covered by this instrument is limited by the scaling ratio (25 to 1) to about 5,000 counts/minute. However where required, this may be easily raised by a factor of 10 or more for applications involving highly radioactive monitoring.

• LE134 Gyco *heating jackets,* produced by Scientific Glass Apparatus Co., have been improved by addition of a small thermostat in the circuit within the insulation, which automatically opens the circuit when the jacket temperature reaches approximately 370°C. This eliminates the danger of fire and burnout of the unit if the flask being heated should run dry.

• LE135 A line of *stainless steel breakers* for laboratory use is now being made in production quantities by Metalsmiths division of Orange Roller Bearing Co., Inc., in the same capacities and dimensions as standard glass beakers. Metalsmiths' beakers are made with smooth, homogeneous butt welds, using no filler or flux. Finished beakers are polished all over and welds are invisible. Available from stock in type 304 stainless steel and monel metal, but can be fabricated of other analyses when required.

onyx chemicals of opportunity



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lower costs with higher active concentrations per pound

It's simple arithmetic that the more active ingredient you get for your detergency dollar, the less you spend. With Onyx super concentrates, you get the highest practical degree of cleansing, foaming and wetting action in every pound. The many varieties of Onyx detergents enable you to test and select the one best suited to your own particular use. Whether your need be for textile scouring or metal degreasing . . . for cosmetics or electroplating . . . for any of ten thousand and one special applications you'll find an Onyx detergent ready to serve.

Listed are a few of Onyx's many detergents, emulsifiers, and wetting agents. Data sheets, prices and samples gladly furnished on request.

Name	Percentage Active Organic Ingredients	Chemistry	Physical Form	Characteristics	Uses
ANIONIC DETERGENTS					
Maprofix NEU Maprofix MM	44%	Sodium Lauryl Sulfate	Cream Colored Powder Cream Colored Paste	Foams instantly into high persistent lather. Excellent wetting and emulsifying properties. Minimum penetration in all waters under varying pHs.	Carpet cleaning, bottle washing, shampoos, metal cleaning and degreasing.
Triethanolamine Lorol Sulfate	75%	Triethanolamine Lorol Sulfate	Amber Paste	Easily aerated. Foams instantly—forms persistent lather. Excellent wetting, penetrating and emulsifying properties. Almost neutral pH.	Shampoos, hand cleaners, cosmetic preparations and general detergents.
NON-IONIC DETERGENTS					
Neutronyx 330	98%	Polyalkyl ether condensate of fatty acids.	Reddish-Brown viscous liquid	Miscible with water, alcohol and many organic solvents. Foams quickly and persistently in all waters.	Emulsifier for cosmetics, industrial cleansers, metal degreasers; as an insecticide dispersant and many other uses.
Neutronyx 560	83%	Aromatic Polyglycol ether.	Amber Liquid	Speedy wetting and emulsification of greases and soil. Compatible with quaternary ammonium compounds. Effective in all waters and under varying pHs.	Cleaner of hard surfaces such as glassware, pots, pans, dishes, metal parts, floors. Also textile scouring and general maintenance.
Neutronyx 600	100%	Aromatic Polyglycol ether.	Amber Liquid	Wholly anhydrous. Miscible and compatible with quaternary ammonium compounds. Readily adsorbed on common alkaline carriers such as TSP, TSPP, Glauber's Salts, etc.	As the detergent and emulsifying ingredient for free-flowing dry detergent sanitizer powders.
Neutronyx 834	98%	Polyalkyl ether condensate of fatty acids.	Waxy Solid (Below 66°F.)	Quick foaming. Soluble in oil, water and organic solvents such as Trichlorethylene, Perchlorethylene, CCl_4.	Emulsifying ingredient for metal degreasers, dry cleaners, insecticides, etc.
Estramine	95%	Fatty acid-Alkanolamine condensate.	Amber Liquid	Free rinsing, miscible in water, alcohol and toluene.	Wool and Textile scouring. Dispersant for heavy dye solutions.
CATIONIC DETERGENTS					
Catiosan Catiosan T	93% 83%	Complex Amide condensation product.	Amber Paste	Superior emulsifier with excellent penetrating and wetting properties. Highly active bacteriostatic, bactericidal, fungistatic and fungicidal action.	Cake bactericidal cleansers, impregnated paper towels for dental, medical and clinical use.

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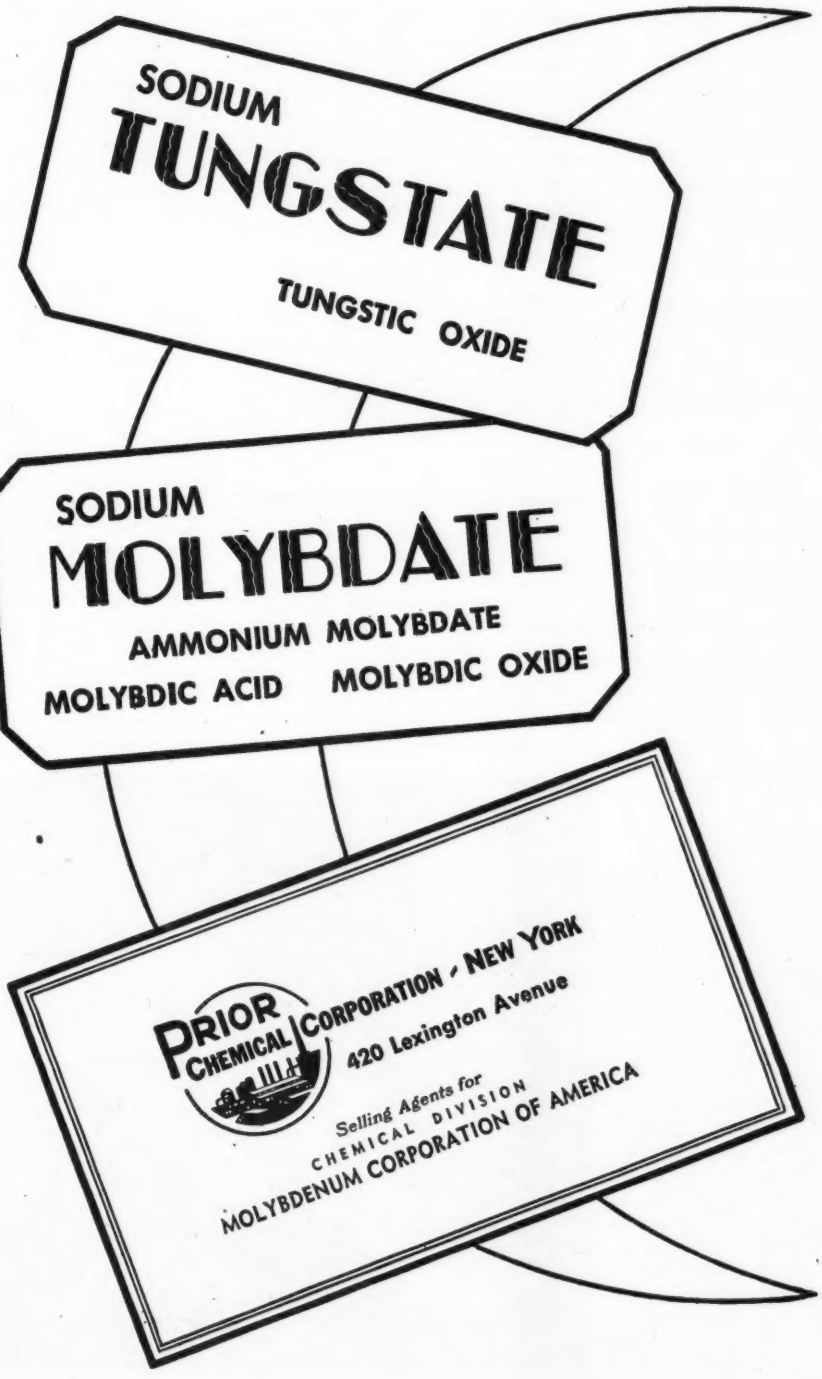
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PACKAGING & SHIPPING

by T. PAT CALLAHAN

Materials Handling Show Eye-Opener to Executives

Of visitors to the third Materials Handling Exposition held in Philadelphia last January, 86.6% found equipment displayed which was of value to their companies, but which they had not known about before, according to a survey made by Elmo Roper for Clapp & Poliak, Inc., exposition management firm, and the American Society of Mechanical Engineers.

Cost reduction is a major industry concern today, and in streamlining the flow of materials into plants, through processing steps, and out of the plant as products lies one of the few areas for substantial reductions. Executives charged with the responsibility of lowering production costs can find many new tools to help in this streamlining. The chemical industry is moving faster than some of the others to exploit the possibilities in this field, and the attendance figures at the Philadelphia show bear this out. Those connected with the chemical and plastics industry led all other industrial groups in attendance, with 12.1%. Percentages some other groups contributed to total attendance were: metals, 9.2%; machinery manufacturers, 8%; paper products, 4.4%; and petroleum products, 3.4%.

In an evaluation of the exposition, 22.9% said that it was very valuable; 74.3% found it valuable; and only 2.2% thought it a waste of time.

Those attending were asked whether they attended the show to get an answer to a specific problem, to see new developments in materials handling, or to attend one or more technical sessions. The chemical and plastics people replied as follows: problem 30.5%; developments, 95.9%; and sessions, 22.1%.

Replies of some other groups are as follows: Machinery manufacturers: problem, 23.8%; developments, 94.3%; sessions, 18.1%. Metals: problem, 30.9%; developments, 95.4%; sessions, 17.6%. Paper products: problem, 39.7%; developments, 92.9%; sessions, 18.3%. Petroleum products: problem, 21.4%; developments, 99%; sessions, 20.4%. Transportation and warehousing: problem, 33.1%; developments, 93%; sessions, 12.1%.

The great interest in equipment to replace costly and slow hand labor in handling materials is shown by the fact that 54.1% of the visitors came to see a particular type or piece of equipment. In this group interest was divided as follows: trackless carriers (including fork or lift trucks, pallet handling equipment, accessories, tractors and other trackless carriers) 59.4%; conveyors, bulk handling equipment, 31.8%; pallets, 13.9%; storage equipment, 10.1%; hoisting equipment (cranes, hoists and other) 9.8%; shipping and packaging machinery, 5.5%; overhead carriers, monorails, etc., 4.9%; conveyor accessories, mixing, weighing, sorting equipment, 3.6%; bridges, ramps, dock boards, 1.6%; floor maintenance equipment, 1.2%; skids, 1%; equipment for special needs, 7%; all other, 8.4%; and no reply, 3.7%.

In answer to the question whether they had seen equipment of value to their companies, 96.5% of those from the chemical and plastics group said that they had. As to whether they would be at next year's show, 37.5% of chemicals and plastics group said they certainly would; 55.2%, probably, and only 7%, no.

Shipping Company Expands

Seaboard Shipping Corp., New York City, has acquired special new equipment and expanded its barge operations into the field of transporting chemical products, in addition to petroleum. The company has purchased a former U. S. Navy seagoing barge especially for this operation and already has handled one international shipment.

A cargo of 2,000 tons of liquid caustic soda and 550 tons of cotton linters was transported from Lake Charles, La., to Havana, Cuba, and similar operations on the Atlantic coast, as well as in the Gulf-Caribbean area, are under consideration. Previously, Seaboard Shipping has been known chiefly for its extensive operations along the Atlantic coast and in the New York barge canal and on the Great Lakes.

Steel Drum Wrench Fits All Plugs

Of particular interest to all users of steel drums is the "All Plug" steel drum wrench manufactured by Michael A. Schinker Manufacturing Co., 6514 S. Western Ave., Chicago 36, Ill.

This master wrench services all foreign and domestic plugs. Because of its excellent design with perfect balance it prevents mutilation of the plugs and injury to the operator's hands. The slide bar handle clears low and high chimes alike with plenty of finger clearance. The large filler plugs are handled just as easily as the small "drain" plugs. This is an ideal tool for servicing compound or double-type plugs and seal cap rings.

Construction and design of this wrench is as follows: A four pronged alloy steel spider, 4½" in diameter is built around a substantial hub through which a ⅝" x 18" steel hexagonal slide bar is fitted. Two drain plug nipples are located at the ends of the bar. An automatic ball bearing stop holds the spider at the center for fast work, a slight tap releases it for heavy pulls to the end of the bar.

Overall view of the Exposition floor at the 18th National Packaging Conference and Exposition of the American Management Association held in Atlantic City last month. Approximately 15,000 packaging executives attended, and of these, about 1,000 sat in on the conference session. Two hundred manufacturers and suppliers exhibited their machinery, materials, methods, and services for the packaging, packing, and shipping industry.

Have Packaging Problems got you up a tree?

Throughout the chemical industries, St. Regis Multiwall Paper Bags are providing new answers to both new and old packaging problems.

ST. REGIS PACKAGING

★ cuts labor and container costs

★ provides chemical products with specific protection against specific hazards (moisture and contamination, for instance)

★ speeds packaging operations

No wonder producers of more than 400 different commodities rely on rugged, economical Multiwalls to deliver the goods in better condition.

If there isn't a St. Regis Multiwall *now* that meets the exact requirements of your product, we probably can *make* you one. St. Regis Research and Development men will be glad to talk over your particular problems, with no obligation on your part—glad to help engineer a bag that meets your specific needs. Just get in touch with your nearest St. Regis Sales Office.

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You Buy Protection When You Buy Multiwalls

To withstand the hardest use, this wrench is properly heat treated, machined and ground.

Since the "All Plug" wrench is self-contained, there are no adjustments, holders, adapters or other easily mislaid parts to bother with. It also eliminates the need for an assortment of wrenches, bars, and gadgets.

A non-spark "All Plug" wrench made of alloy copper is available for use in industries where dangerous dust or vapor may be ignited by a spark caused by a hammer or a wrench.

American Flange Opens Eastern Plant

The American Flange and Manufacturing Co., Inc., has opened a new plant in Linden, N. J., with complete facilities for the production and delivery of Tri-Sure closures for drums. This plant is set up for fast delivery and gives customer assurance of immediate attention. The company operates two other factories that produce steel drum fittings—in St. Catharines, Canada, and Chicago. Each plant will thereby operate with maximum efficiency in supplying fast service in its own area.

John Myers, secretary of the company, presided at the official opening that set the machinery into motion. (See accompanying picture.)

John Myers, American Flange & Manufacturing Co., presses button in official start-up of new Linden, N. J. plant.

Giant Glass-Lined Tank For Chemical Storage

The Pfaudler Co., Rochester, N. Y., is producing one-piece glass-lined chemical storage tanks in greatly increased sizes up to 35,000 gallons capacity. This is believed to be a new record for glass-lined steel as a material of construction for such chemical service.

Long needed by the chemical industry for bulk storage of chemicals, these large glass lined chemical storage tanks will now eliminate frequent and costly replacements of other materials of construction due to corrosive conditions present. Pfaudler glass-lined processing units are fully resistant to all acids at all concentrations except hydrofluoric and concentrated phosphoric acid.

Lightweight Pallet Truck For Expendable Pallets

Expendable 4-way corrugated paper pallets having large cylindrical supporting columns can now be handled by a newly designed hand pallet truck offered by the Lyon-Raymond Corp., 2466 Madison St., Greene, N. Y.

The large 8" diameter columns in the

center and at the outer edges of the pallet make it necessary to provide a truck which has a narrow overall width and at the same time provides a wide space between the forks. Lyon-Raymond has redesigned the standard lightweight hydraulic pallet truck, making each fork ony 6" wide and allowing a 10" opening between forks. Thus the overall width is only 22".

Features of the new model also include rubber tired front wheels, handle holdup, and an improved foot pump with separate pedal release. A friction brake engages the floor when the towing handle is held in the "down" position.

Capacity of this new truck is 2000 lbs. It has a lowered height of 3¼" and an elevated height of 7¼". Because of the unique dressing and the standard booster rolls in the fork ends, this truck will also operate in the standard double faced wooden pallet.

Stacking and Loading Subject of New Booklet

The Hinde & Dauch Paper Co., Sandusky, Ohio, has published a revised edition of *How to Stack and Load Corrugated Shipping Boxes,* one of its Little Packaging Library booklets. Pointing out that proper stacking and loading can make a big difference in time, costs and profits, the booklet lists the fundamental rules of

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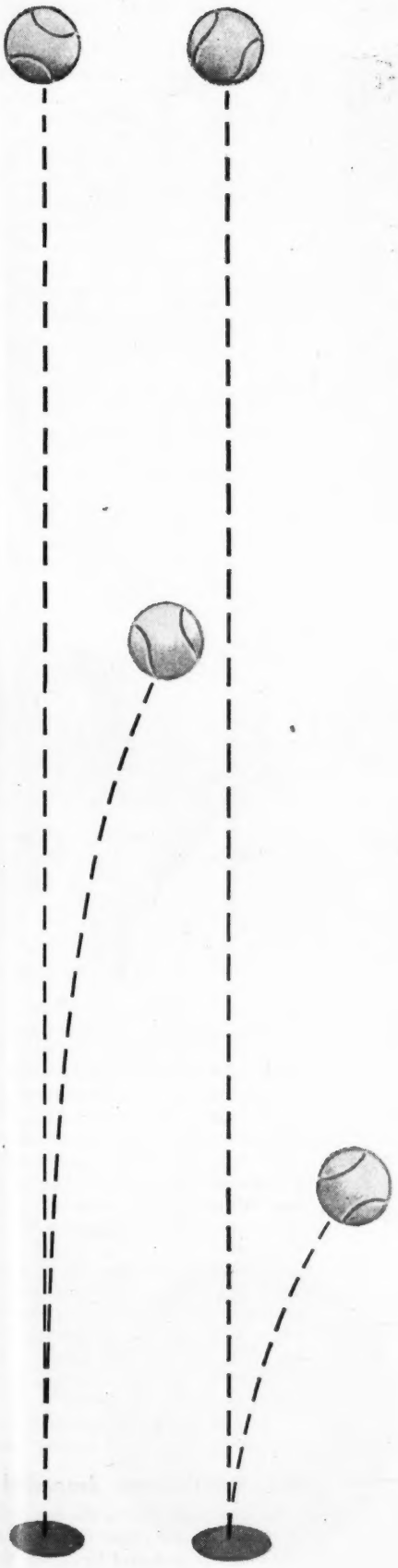

Getting "more bounce" into your business

Some 15 years ago a simple packaging trick put more bounce into tennis balls.

The trick—putting them in a key-opening can under pressure—pleased everybody.

Inventories could be built up in slack seasons without fear that the tennis balls would go stale.

Shelf and window displays could be made in sporting goods stores easily.

Players had tennis balls with more bounce . . . any time . . . any place.

Perhaps similar expert packaging advice on the part of American Can Company will get "more bounce" into your product.

Canco know-how in devising new and better packaging methods has paid off in extra profits for others for 48 years. Maybe it can do the same for you.

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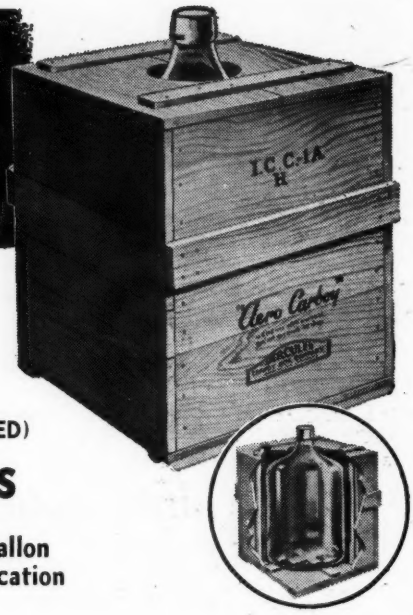

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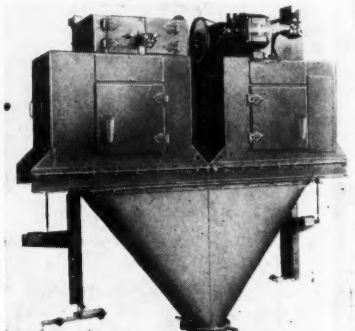
good storage which anyone engaged in shipping and receiving room operations would do well to memorize. The book offers some excellent suggestions on the proper way of loading and unloading freight cars and trucks, on the best methods of estimating and using storage space, on the right distribution of weight in storing shipping boxes, on the most efficient arrangement of tiers, and various other valuable tips on warehouse engineering.

Much damage and waste occur in storage of merchandise as well as in shipping, and the booklet is aimed at correcting such losses. The company will send a copy on request.

New All-Electric Bagger

The Richardson Scale Co., Clifton, N. J., is producing a new, all-electric automatic duplex bagging scale. It accommodates gravity or powder feed arrangements for bagging feed, meal, grain, chemicals, fertilizers and most other materials normally put in open-mouth paper or textile bags.

Designated the Model E-50 Duplex, the



new bagger comprises two scales with a common bagging spout. It has a normal range from 5 lb. to 25 lb. and from 25 lb. to 50 lb. Units of greater capacities can be furnished for special applications.

The bagging machine is capable of handling twenty-four 10-lb. bags and eighteen 25-lb. bags per minute, speeds varying with the type of material, method of feeding and size of unit weighing. Slip-on spouts are supplied for changing bag sizes as required.

The machine is totally enclosed to provide dustproof operation and all electrical construction is explosion-proof, conforming to requirements of the National Electric Code and National Board of Fire Underwriters for Class 2, Group G hazardous locations.

The E-50 can be used independently or as part of a coordinated packing system.

ICC Regulations Amended

Slight amendments to the Regulations of Explosives and Other Dangerous Articles were promulgated by the Interstate

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The impressive list of multiwall orders we have filled at our new plant in New Orleans would be the quickest and best way we know to tell you the wonderful success story of Fulton Multiwall Paper Bags.

Voluntary comment received from these quantity users of multiwalls speaks for itself. Generous compliments on the clean cut appearance, workmanship and uniform quality of Fulton Multiwalls is conclusive evidence they have passed the final test with flying colors.

Give us the opportunity to win a compliment from you. Try Fulton on your next order for Multiwalls — pasted or sewed bottom, open or valve type — we make them all.

Call on us also for your requirements in cotton or burlap bags including waterproof paper lined textile bags.

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Commerce Commission on April 14, 1
Of particular interest to the chemical
dustry were amendments to I.C.C. Sp
fication 37E and 37F, metal drums
export service; wooden barrels for hy
fluosilicic acid; additional containers
the shipment of anhydrous hydrazine a
hydrazine solutions containing 50% or le
of water; inclusion of monel metal drum
for shipments of hydrocyanic acid liquid
exemption of cyanide mixtures not ove
one pound each; amendments to Speci
fication I.C.C. 12B; amendments to Speci
fication I.C.C. 17E to provide for closure
of materials other than metal on single
trip drums of 12 gallons capacity and less
amendment to I.C.C. Specification 17X t
provide manufacturing tolerances and out
age requirements consistent with othe
drum specifications.

Better, Faster Printing On Multiwall Bags

New four-color printing presses d
signed and built by St. Regis Paper C
make possible faster printing on kra
paper, and enhance appearance of adve
tising on multiwall paper bags.

Multiwall bags offer manufacturers
industrial and agricultural commoditi
effective and colorful presentation
brand identification and commodity i
formation to their customers in parti
ular and the public in general. Because
this factor, a better method of high qu
ity and faster printing on heavy kr
paper was necessary. Since modificati
of conventional presses for kraft prin
ing was expensive, St. Regis develop
the new press, called the Burroughs pre
after its designer, Edwin E. Burro
chief engineer of the St. Regis M.
wall Bag Division.

Two Burroughs presses are in ope
ation at the St. Regis Pensacola, Fl
bag plant, and a third is being instal
at the company's new San Leandr
Calif., bag plant. Five more presses a
under construction.

Beta-Naphthylamine Safety Data Sheet

The Manufacturing Chemists' Assoc
tion has published Chemical Safety Da
Sheet SD-32 on *beta*-naphthylamine. D
signed for supervisory staffs and manag
ment, it presents essential information
the safe handling and use of this chemic

The manual sets forth clearly the i
portant physical and chemical propert
of *beta*-naphthylamine; usual shipp
containers and methods for their unlo
ing and emptying; container storage a
handling, and recommended personal p
tective equipment.

The new manual may be obtained
20 cents per copy from the Manufactur
Chemists' Association, 246 Woodwa
Building, Washington 5, D. C. Rem
tance should be sent with each order.

Cowles CHEMICALS

DRYMET*

The Economical Detergent Silicate

Cowles DRYMET, anhydrous sodium metasilcate, is the most highly concentrated form of sodium metasilicate available. It is more economical to use, on the basis of both Na_2O (alkalinity) and SiO_2 (silicate) than any other type of hydrated or anhydrous detergent silicate, either compounded or by itself. DRYMET contains no water of crystallization.

CRYSTAMET*

The Medium pH Detergent Silicate

Cowles CRYSTAMET is a pure, perfectly white, free-flowing granular pentahydrate sodium metasilicate with the normal 42% water of crystallization. Suggested for compounding when it is desirable to lower the concentration of a finished product. Readily soluble — chemically stable — easy to handle. Can be used on medium pH jobs.

DRYSEQ*

The All-Purpose Detergent Silicate

Cowles DRYSEQ, anhydrous sodium sesquisilicate, is a medium pH alkaline cleaner which will do fast, dependable work at a low cost to the user. It is a white, free-flowing powder, quickly and completely soluble in hot or cold water—containing 56.75% Na_2O—making it an economical base material for compounding.

DRYORTH*

The Heavy-Duty Detergent Silicate

Cowles DRYORTH, anhydrous sodium orthosilicate, is a powerful, speedy, heavy-duty cleaner with valuable penetrating and wetting-out properties, reinforced dirt-removing power and unusual emulsifying action. It is an anhydrous, free-flowing powdered silicate containing not less than 60% Na_2O, which may also be used as an economical constituent of high pH cleaning compounds.

We'll be glad to send you our DRYMET File Folder containing complete technical information and suggested formulations.

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PLANT OPERATIONS NOTEBOOK

Respiratory Protection

Respirators are of great aid in protecting workers from organic solvent vapors. They are especially useful for small solvent operations where mechanical ventilation is not practical; for occasional operations involving large amounts of solvent vapors, such as tank cleaning; and for additional protection to that provided by mechanical ventilation.

Where vapor concentration is below 2 per cent, a gas mask which removes the contaminant chemically may be used. This type of respirator consists of a mask connected by a short length of tubing to a canister, strapped on the chest or back, containing a chemical to remove solvent vapor from the air as it is inhaled.

As different vapors require different chemicals, the canister should be clearly marked to indicate the impurities for which it is suitable. The canister should be discarded as soon as the odor of solvent become noticeable to the wearer. Where possible, a record should be kept of the time each one has been in active use, so that it may be discarded when its limit of service has been reached. If in doubt, discard it.

Some gas masks are equipped with a chemical cartridge, rather than with a canister for only slightly contaminated air. Their life span is short, and they are not approved for regular use.

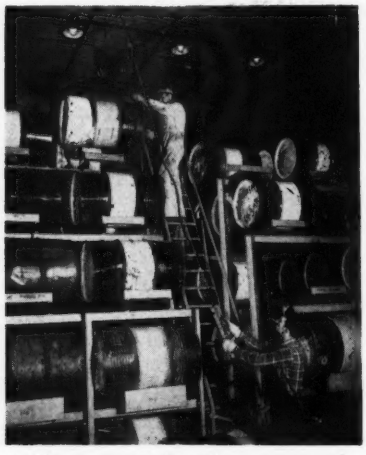
If the air is deficient in oxygen or contains a high vapor concentration, as in solvent tanks an independent source of air must be provided. This is done with a "supplied air" respirator, which supplies air from an uncontaminated area to the respirator by a long, flexible hose. If the hose is longer than 25 feet, the air must be forced in by a manually operated blower. In addition, the wearer should be protected by a watcher and a life line strong enough to lift out the man in the tank.

Compressed air may be used to feed air to the wearer of the respirator. In this case, the respirator used is equipped with a narrow-diameter high-pressure tube instead of the hose and is known as the "air line" type. Since air cannot be breathed naturally through the small hose, air line respirators should not be used where the atmosphere is so toxic that it would be dangerous to remove the mask for a few minutes in case of failure. Under such circumstances, the supplied air respirator with large-diameter hose or self-contained oxygen breathing apparatus must be used.

All respirators should be of types approved for the specific conditions of use by the U. S. Bureau of Mines. Masks should be carefully adjusted and tested for leaks before operations begin.

Caution should be observed by those depending upon respirator protection. A respirator may protect the individual operating the process, but vapors can spread and endanger workers in nearby areas. Even with respirators, workers should not be exposed to highly contaminated atmospheres because of the danger of skin difficulties and also, with certain solvents, of fire. Respirators are not a substitute for good ventilation.

Drum Storage



A floor-operated bridge crane and a movable ladder permit safe stacking of drums at the Westinghouse Electric Appliance Division Plant at Mansfield, O. Other safety features of this paint storage room are vapor-proof electrical fixtures, spark-proof floors and tools, exhaust fans, and use of spring-closing brass valves when making withdrawals. Drip pans prevent spread of inflammable material.

NOMOGRAPH-OF-THE-MONTH Edited by DALE S. DAVIS

Readers are invited to submit for publication in this department any original nomographs pertaining to chemistry or engineering. $10 *will be paid for each one used*

Nomograph for the Determination of Overhead Temperature in an Amine Stripper

by WILLIAM C. FRISHE
Clarkson College of Technology
Potsdam, N. Y.

IN the continuous scrubbing of acid gases (hydrogen sulfide, carbon dioxide or both) from a gas stream by an aqueous amine solution, the amine is reactivated in a standard stripping column. The concentrated amine solution goes to the bottom of the column; the acid gases, which are saturated with steam, constitute the overhead. This overhead stream is cooled; the condensate is separated from the acid gas and is returned to the bottoms amine solution. It is necessary to know the temperature at which the overhead gases leave the column in order to calculate the mean temperature difference for design of the heat exchanger in which the steam is condensed and the acid gases are cooled. The heat exchanger duty is calculated from the heat balance:

Top heat exchanger duty = reboiler duty —lean solution cooler duty.

Given: the top heat exchanger duty, Q, B.t.u. per hour
the acid gas quantity, V, standard cubic feet per hour
the pressure at the heat exchanger inlet, P, pounds per square inch, absolute
the temperature at the heat exchanger outlet, t_2, °F

it is desired to calculate the temperature t_1 °F. at the heat exchanger inlet. This temperature will be such that if the acid gas is saturated with steam at a pressure of P, the total enthalpy in the steam and acid gas above t_2 will be equal to Q.

The general method for calculating t_1 is as follows: Assume a value of t_1 and calculate Q_s, the acid gas duty in the heat exchanger, from the expression

$$Q_s = C_p V (t_1 - t_2)$$

where C_p is the specific heat of the acid gas in B.t.u. per cubic foot per °F. Q_s, the steam duty in the heat exchanger

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will then equal $Q - Q_s$. From steam tables obtain the change in enthalpy H of steam between t_1 and the temperature of the water, t_2. The specific volume of steam is 21.05 cubic foot per pound, from which

$$S = 21.05\, Q_s/H$$

where S is the number of cubic feet per hour of steam overhead.

The partial pressure of steam in the overhead is $SP/(S+V)$. If this partial pressure corresponds to a saturation temperature of t_1, the assumption is correct. If not, then a new value of t_1 is assumed close to the calculated value and the calculations are repeated.

This trial-and-error process is simplified by letting $t_2 = 115$ and assuming that $C_p = 0.022$ B.t.u. per cubic foot per °F. The general solution is then:

$$Q = 0.022\, V\, (t_1 - 115) + \frac{S\, H_s}{21.05}.$$

Since $SP/(S+V) = f(t_1)$, $S = V\, f(t_1)/(P - f(t_1)$ from which

$$Q/V = 0.022\, (t_1 - 115) + H\, f(t_1)/21.05\,(P - f(t_1)$$

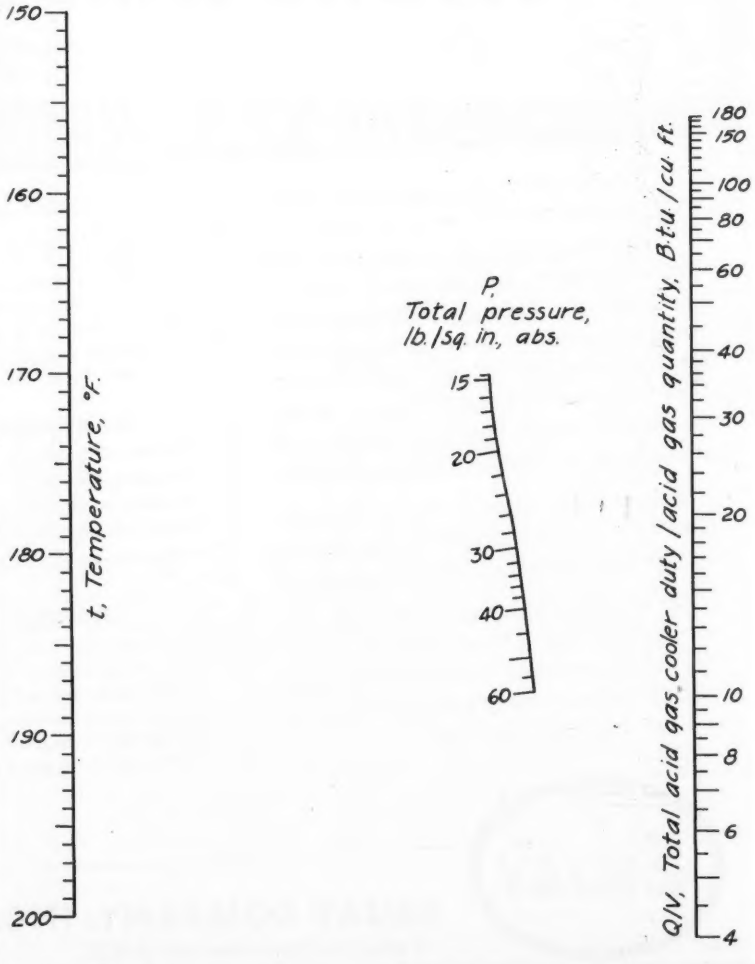
or $$Q/V = 0.022\, (t_1 - 115) + 48.45\, f(t_1)/(P - f(t_1)$$

on the assumption that $H = 1020$ B.t.u. per pound.

The equation can be solved conveniently and accurately by means of the accompanying nomograph which was constructed by methods described previously[1]. The use of the chart is illustrated as follows: What is the temperature of the overhead stream at the inlet to the heat exchanger if the top heat exchanger duty is 41,300 B.t.u. per hour, the rate of flow of acid gas is 2065 cubic feet per hour and the pressure at the top of the stripper is 30 pounds per square inch, absolute? The quotient Q/V is 41,300/2065 or 20. Connect 20 on the Q/V scale with 30 on the P scale and read the value of t_1 as 184 ° F.

Literature Cited

(1) Davis, D. S., "Empirical Equations and Nomography," Chap. IX, New York, McGraw-Hill Book Company, 1943.



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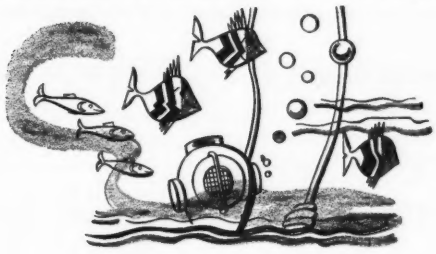

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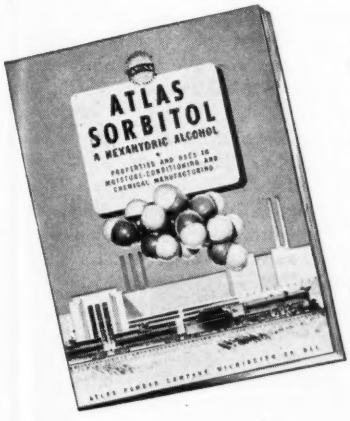

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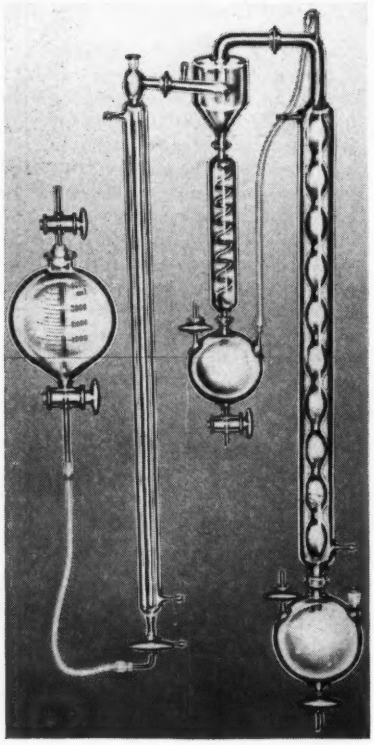

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*Bartholomew, W. H. *Anal. Chem.* 21 527 (1949)

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LABORATORY NOTEBOOK

Safe Handling of Glassware

In many laboratories, by far the greatest number of hand injuries results from failure to take the necessary precautions when inserting glass tubing into rubber stoppers or into rubber tubing, according to the National Safety Council. Obviously, suitable hand protection would eliminate many of these hand injuries.

Here are a few simple precautions that have been found effective in reducing accidents in the handling of glassware:

1. When there is any possibility of injury from breakage of glass, protect your hands by either wrapping a towel around the equipment or wearing heavy cotton gloves with leather palms.
2. Always fire-polish or otherwise smooth jagged edges on glass tubing.
3. Bore the hole in stoppers large enough so that glass tubing will fit snugly without being forced, or use rubber tubing that is no tighter than a snug fit. Lubricate glass tubing with water, glycerine, or other suitable agent before inserting it in the stopper.
4. Cracked, chipped, or broken glassware should be either discarded or repaired.
5. Rinse out all glassware to be sent to the washroom, and thoroughly clean any glassware which is to be sent to the glassblower for repair.
6. Support large flasks firmly by the bottom and sides while carrying them. Do not grasp them by the neck and swing them through the air, since the scored neck will fracture easily.
7. Use a dustpan and brush to clean up broken glass. If corrosive liquids were spilled, decontaminate the area first.

Thermal Expansion of Ceramic Materials

Lack of needed fundamental thermal expansion data of highest accuracy on many earth materials has become of enough importance to justify a thorough research project. Such data are needed more and more in geophysical and mineralogical studies and will also be useful to industries that use and manufacture ceramic materials.

Fundamental data on the earth materials will be obtained over a period of several years at Rensselaer Polytechnic Institute, Troy, N. Y., according to present plans. Professors Joseph L. Rosenholtz and Dudley T. Smith, who recently set up special testing equipment in the Department of Geology and Mineralogy, have started on the project. Purchase of this equipment was provided largely by Rensselaer's Research Fund but also by grants-in-aid from Carnegie Corp., New York, and Research Corp., New York.

The investigators will determine the linear thermal expansion of rocks and crystallographically oriented mineral specimens at temperatures ranging from 20° C. to 1,400° C. Mineral transformation temperatures will also be determined.

Specimens are ¼" square prisms ½" long, prepared by sawing mineral crystals parallel to their crystal axes. They are placed in the closed end of a 20" long quartz dilatometer tube which is in a small cylindrical electric furnace. The open end extends horizontally out of the furnace and into an Invar sleeve on a follower unit that was specially designed by the Testing Equipment Department of The Baldwin Locomotive Works, Eddystone, Pa.

The microscopic changes in length of the half-inch specimens with increasing temperature are measured by the Invar follower unit which incorporates a Microformer extensometer (miniature transformer with movable core) and recorder that were recently developed by The Baldwin Locomotive Works. The core of the Microformer extensometer is activated by an Invar lever which is in turn activated by a quartz rod extending through the quartz tube to the end of the specimen in the furnace.

Expansion of the specimen may be magnified up to approximately 2,000 times by the Microformer Recorder which automatically draws a deformation-time curve on the recorder chart. This equipment incorporates a self-balancing transformer bridge which is sensitive to length changes of the order of two millionths of an inch.

Displacement of the core of the extensometer follower unit in either direction unbalances the bridge circuit. The unbalanced signal is amplified and drives a servo motor which, in turn, rotates the recorder drum and at the same time moves the core of the Microformer recorder to a position where its output again balances that of the Microformer extensometer.

Temperatures are recorded and controlled by a special Leeds and Northrup Micromax unit which makes it possible to heat and cool at predetermined rates and to hold any pre-set temperature. This instrument draws a time-temperature curve.

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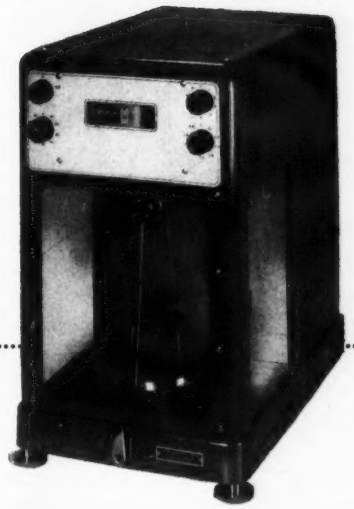

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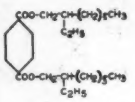

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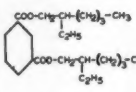

Di(2-ethylhexyl)-isophthalate
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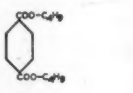
Light yellow liquid



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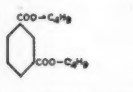

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INDUSTRY'S BOOKSHELF

Colloids

COLLOID SCIENCE *by A. E. Alexander and P. Johnson.* Oxford, 1949, xxii + 837 pp.; in two volumes (pagination continuous). $15 the set. Reviewed by Sydney Ross, associate professor of chemistry, Rensselaer Polytechnic Institute.

THIS BOOK is the only one now in print that provides a coherent account of the whole field of colloid chemistry at an advanced level. Its scope is not as wide nor are its contents as heterogeneous as its American namesake—Jerome Alexander's six volume collection of papers entitled Colloid Chemistry. But it is free from the diffuseness of the latter book and, since it is the work of only two collaborators, presents a uniform and consistent viewpoint throughout.

This viewpoint may be subject to dispute here and there and even Professor Rideal, to whom the book is informally dedicated and who provides it with a brief Foreword, indicated some areas of disagreement with the authors; yet the bias of the authors is intuitively sensed (occasionally explicitly stated) and can then be suitably evaluated by the reader.

The book is divided into three parts. Part I, an historical and general survey, includes an excellent treatment of the application of thermodynamics to colloid systems and another on the application of Debye-Hückel theory to colloidal particles. These chapters indicate the stress given by the authors to the physico-chemical basis of colloid science. Part II deals with experimental methods and their theoretical basis, with the emphasis again placed on the theory. Slightly more than half the book is devoted to this portion of the subject, which includes accounts of the underlying theory of sedimentation, diffusion, viscosity, X-ray diffraction, electrophoresis, etc. Each one is necessarily brief but adequate for an introductory treatment. Part III, bound as a separate volume, contains descriptions of the principal colloidal systems, including gels, foams, emulsions, colloidal electrolysis, clays, proteins, polymers and membranes. The topic of the inorganic colloids, however, now increasingly important since atomic fission has rejuvenated interest in all inorganic chemistry, deserves more than the silence it receives here.

The authors have undertaken an ambitious and worthy project and have carried it out with competence and authority. They have failed occasionally to mention modern contributions, such as Eyring's theory of viscosity or Weiser's work on the hydrous oxides, but in the context of what is here accomplished those omissions cause more surprise than annoyance. If only this potentially useful book had an adequate index. . . .

Trade Names

HANDBOOK OF MATERIAL TRADE NAMES *by O. T. Zimmerman and Irvin Lavine,* Industrial Research Service, Dover, N. H. 503 pages, $8.00. Reviewed by J. J. Craig, assistant editor, CHEMICAL INDUSTRIES.

ALTHOUGH this book is not confined to trade names of chemical products, the proportion of those listed that are related to the chemical industry is large enough that one has to go looking for non-chemical materials. This is good evidence that trade naming is perhaps most popular in this industry, and that a book of this kind is of greatest benefit to those primarily responsible for this mass "name calling."

Undoubtedly a manufacturer who gets this book and hunts out the combinations of sounds, letters and numbers by which his products are designated is going to find a few missing. Products and new names have been coming out at a great rate since publication of this book, and the authors admit they may have missed some. They have made a good start in telling the vital statistics of over 5,000 trade-named materials—what they are, their use, the manufacturer or distributor, and his address. Moreover, the authors hope to revise and expand the volume periodically.

While one trade name may fix a manufacturer's product in buyers' minds, 5,000-odd make a labyrinthian body of knowledge. This book should make it easier for anyone concerned with buying, selling or using trade-named materials—particularly chemicals—to thread through the maze.

Other Publications

THE ROYAL INSTITUTE OF TECHNOLOGY (KTH), STOCKHOLM is a catalogue describing the organization, staff, laboratories and current research work of that Institute. Available at $10.00 in photostat, $3.50 in microfilm form from Library of Congress, Photoduplication Service, Publication Board Project, Washington 25, D. C.

HANDBOOK OF CHEMISTRY AND PHYSICS, 31ST EDITION, edited by C. D. Hodgman, includes mathematical tables, properties of the elements and compounds, chemical tables. $6.00, 2756 pp., The Chemical Rubber Co., 2310 Superior Ave., Cleveland 14, Ohio.

BRITISH CHEMICALS AND THEIR MANUFACTURERS, a 141-page directory to the British chemical industry, is available free of charge to firms interested in the purchase of chemicals. Association of British Chemical Manufacturers, 166 Piccadilly, London, W. 1, England.

CHARTS OF COMPRESSIBILITY FACTORS AND CHARTS SHOWING QUANTITIES DELIVERED BY COMMERCIAL CYLINDERS FOR HYDROGEN, NITROGEN, AND OXYGEN, by H. J. Hoge, C. H. Meyers, and

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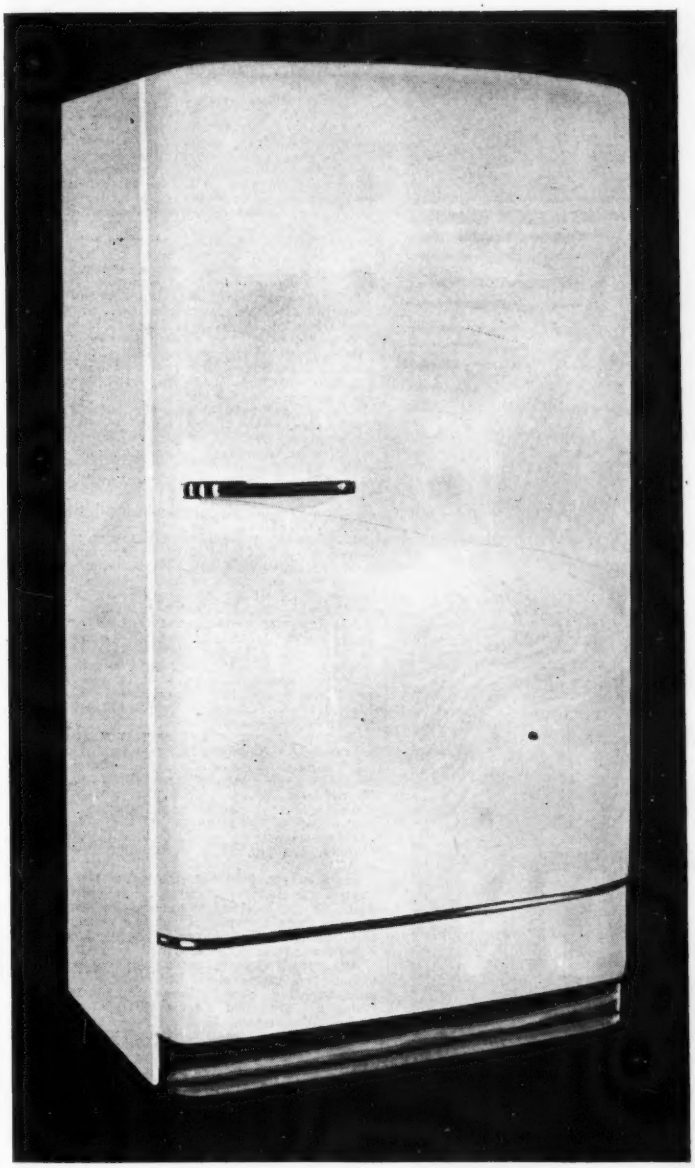

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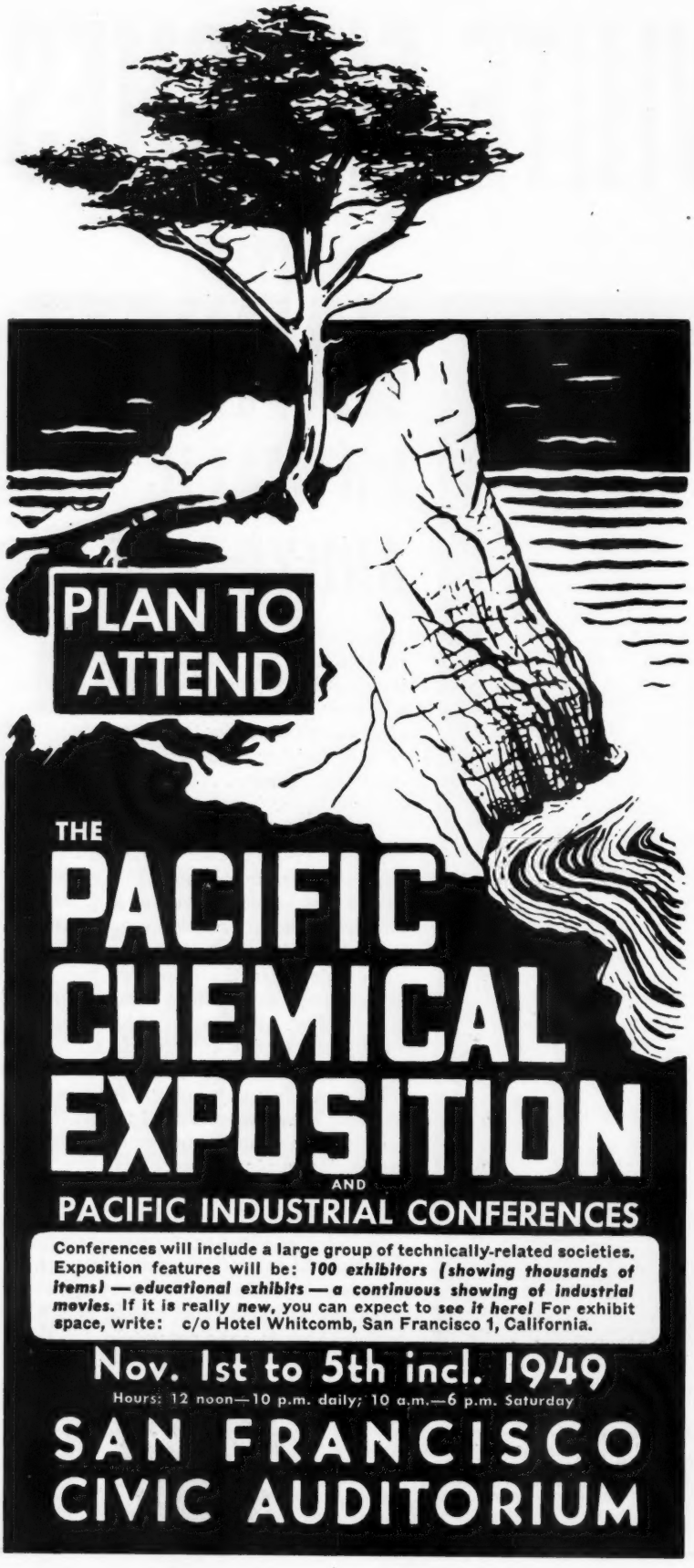
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WAGNER INDUSTRIAL PRODUCTS NEWS is a new bi-monthly whose objective is to circulate news of the company's electrical products to industrial plants. Editor, W.I.P. News, Wagner Electric Corp., 6491 Plymouth Ave., St. Louis 14, Mo.

PANEL DISCUSSION ON INFLUENCE OF NONFERROUS METALS AND THEIR COMPOUNDS on Corrosion of Pressure Vessels, a symposium presented at the 51st annual meeting of the A. S. T. M. 45 pp., $1.00, A.S.T.M. Headquarters, 1916 Race St., Philadelphia 3, Pa.

THE UTILIZATION OF SUCROSE BY THE MAMMALIAN ORGANISM by Walter W. Wainio, is a 45-page research report. Available free of charge in this country, $0.50 overseas, from Sugar Research Foundation, Inc., 52 Wall St., New York 5, N. Y.

LIME HANDLING, APPLICATION AND STORAGE IN TREATMENT PROCESSES by Willem Rudolfs should prove helpful in the design of chemical processes where lime is used as a coagulant, precipitant, or neutralizing agent. One copy, free of charge; additional copies, $0.50 each plus postage, National Lime Association, 927 Fifteenth St., N. W., Washington 5, D. C.

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ISOTOPES AND THEIR APPLICATION IN THE FIELD OF INDUSTRIAL MATERIALS by P. C. Aebersold is a reprint of the 1948 A.S.T.M. Edgar Marburg Lecture. 28 pp., $1.00, A.S.T.M. Headquarters, 1916 Race St., Philadelphia 3, Pa.

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GERMAN LOW-TEMPERATURE COAL-TAR INDUSTRY is one of a series of Bureau reports on wartime German developments in the mining, preparation and utilization of coal. 84 pp., free of charge, Publications Section, Bureau of Mines, 4800 Forbes St., Pittsburgh 13, Pa.

THE CHEMISTRY AND UTILIZATION OF BARK, Bulletin No. 25, is a report of the conference in 1948 at Cambridge, Mass. $3.00, 133 pp., Northeastern Wood Utilization Council, Inc.

DIE NEUESTEN FORTSCHRITTE IN DER ANWENDUNG DER FARBSTOFFE is available in U. S. A. from Newton Publishing Corp., 114 E. 32 St., N. Y. 16, N. Y., for $20.70.

A.S.T.M. MANUAL OF ENGINE TEST METHODS FOR RATING FUELS presents the five standard methods for rating motor, aviation, and Diesel engine fuels. 1 to 9 copies, $8 each, 10 to 49, $6.00, 50 and over, $5.50. A.S.T.M., 1916 Race St., Phila. 3, Pa.

SYMPOSIUM ON FUNCTIONAL TESTS FOR BALL BEARING GREASES, Special Technical Publication No. 84, 103 pp., $1.75 each, address same as above.

PROGRAM FOR PROFESSIONAL ENGINEERING EDUCATION IN PLASTICS sketches an integrated program of professional engineering education in plastics and the types of engineers required in this industry. No charge, Society of Plastics Engineers, Inc., Athens, Ohio.

THE DEPARTMENT OF COMMERCE now has available a two-volume study on valuable drug and animal-feeding preparations. $2.50 per set. Office of Technical Services, Dept. of Commerce, Washington 25, D. C.

Films

THE EASIER WAY, a two reel 16 mm, 21-minute sound motion picture shows how motion study of production operations usually makes the workman's job easier. Free of charge to interested groups. James Craig, Film Section, Dept. of Public Relations, General Motors Corp., 9-252 General Motors Bldg., Detroit 2, Mich.

FIRE-FIGHTING WITH WETTER WATER is a 20-minute 16mm sound movie in color. Available for free showing to municipal, volunteer, and industrial firemen or groups interested in fire-fighting and fire-prevention. Carbide & Carbon Chemicals Corp., Room 328, 30 East 42 St., New York 17, N. Y.

INDUSTRIAL HEATING consists of a 25-minute black-and-white sound slidefilm and five different application data booklets for industrial education. The program kit, which includes the film and 50 copies of each of the 5 booklets, is available from General Electric Co. district offices for $15.

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The B&A Saftepak is made of pure polyethylene, a tough and resilient plastic which is inert or resistant to most chemicals, including organic solvents at ordinary temperatures. The extent of its applications is limited only by the properties inherent with polyethylene. These include resistance to most mineral acids and alkalies at temperatures up to 160° F. and organic solvents with temperatures less than 125° F. Also serviceable at temperatures down to −50° F.

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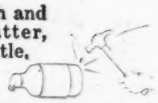

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Spraying in electrostatic field causes paint particles to "wrap around" article, reversing direction as much as 180°, almost completely utilizing coating material.

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BOOKLETS & CATALOGS

Chemicals

Isovaleraldehyde **B696**
Bulletin giving physical properties, appearance and odor, chemical properties, and suggested uses. 1 p., Millmaster Chemical Corp.

Di-tert-butyl-para-cresol **B697**
Bulletin giving preparation of several representative dispersions of di-tert-butyl-para cresol. Bulletin No. C-9-115.1, 3 pp., Koppers Company, Inc.

Propiophenone **B698**
Technical bulletin giving specifications, uses and reactions of propiophenone. Bulletin No. C-9-133, 13 pp., Koppers Company, Inc.

Mono-tert-butyl-meta-Cresol **B699**
Technical bulletin giving specifications, uses and reactions of mono-tert-butyl-meta-cresol. Bulletin No. C-9-130, 23 pp., Koppers Company, Inc.

Petroleum Sulfonates **B700**
"Petrosuls," a 6-page pamphlet giving specifications, properties, and applications. Pennsylvania Refining Co.

Acrylic Molding Powder **B701**
Booklet announcing new Lucite HM-140, improved acrylic molding powder. Gives detailed list of properties and describes improved features. 4 pp., E. I. du Pont de Nemours & Co.

Plastics **B702**
Plastics Bulletin No. 42 describing new uses for plastics in various types of commodities. 4 pp., E. I. du Pont de Nemours & Co.

beta-Methyl Umbelliferone **B703**
Technical Bulletin No. C-9-111 giving specifications, properies, uses, and reactions of beta-methyl umbelliferone. 27 pp., Koppers Company, Inc.

Color Adsorbent **B704**
Duolite Data Leaflet No. 4, giving properties and uses of Duolite S-30 color adsorbent resin. 3 pp., Chemical Process Co.

Malononitrile **B705**
Schwarz Laboratories, Inc., Bulletin No. 118, giving formulas and properties of malononitrile. 3 pp.

Paper Lubricant and Plasticizer **B706**
Bulletin describing use of Aroclor 1254, chlorinated biphenyl, as a lubricant in manufacture of fire-resistant paper drapes and as a co-plasticizer for the vinyl coating on paper drapery material. 5 pp., Monsanto Chemical Co.

Insulation ***B707**
Manual on 85% magnesia insulation, illustrated with line drawings and photographs. Includes information on properties, determination of correct thicknesses, application and finishing, insulation maintenance, practical applications of heat ransmission theory, technical terms, trade terms, etc. 96 pp., Magnesia Insulation Mfgs. Assoc.

Coatings **B708**
Folder describing characteristics and uses for Permaskin vinyl corrosion-resistant protective coatiings 4 pp., Dennis Chemical Co.

Ethyl Cellulose **B709**
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Oxidizing Alkyd **B712**
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Chemicals & Reagents **B713**
Standard Scientific Supply Corp. offers new 68-page catalog listing chemicals and reagents for latest procedures in all types of clinical and diagnostic tests.

Hydraulic Fluid **B714**
Technical Bulletin No. P-137 giving detailed descriptions of Aroclor 1248, a non-flammable, non-corrosive and economical hydraulic fluid for metal die-casting systems. 13 pp., Monsanto Chemical Co.

Wetting and Rewetting Agent **B715**
Product Data Sheet giving properties and applications of Surfax 1288. 2 pp., E. F. Houghton & Co

Sodium Trifluoroacetate **B716**
Preliminary Technical Data Sheet No. 377, describing properties, suggested uses, and reactions. 2 pp., Hooker Electrochemical Co.

Preservative **B717**
Monsanto Progress Report, "A Guide to Formulating and Applying Milmer 1." Discusses material in detail and gives minimum formulations and methods of application to properly protect textiles, plastic coated fabrics, protective coatings and other products. 15 pp., Monsanto Chemical Co.

Insecticide **B718**
"Direct Control of Grasshoppers with Chlordane." Technical Supplement No. 201-B, 4 pp., Julius Hyman & Co.

Water Conditioner **B719**
Four-page folder describing the applications, advantages, uses and installation of Bru-cex, a conditioner for commercial and industrial water systems. Bruner Corp.

Synthetic Organic Chemicals **B720**
Catalog of Celanese Corporation of America's synthetic organic chemicals. 24 pp.

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"Prufcoat Proof Packet"—easy-to-file folder of essential information on use and specification of Prufcoat protective coatinga. Prufcoat Laboratories, Inc.

Fiberglas **B722**
New 12-page manual describing the Fiberglas products, "Fiberglas Products for Plastics Reinforcement. Owens-Corning Fiberglas Corp.

Thermoplastic **B723**
Three technical bulletins on new thermoplastic Kel-F. No. 1-1-49, "Physical and Mechanical Properties," 4 pp.; No. 2-1-49, "Modification of Properties by Heat Treatment," 2 pp.; No. 3-1-49, "Molding Techniques," 7 pp. The M. W. Kellogg Co.

Plastics **B724**
Brochure giving outstanding properties of American Cyanamid Co.'s line of molding materials and resins. 12 pp.

Plasticizers **B725**
A 65-page catalog giving specifications, commercial uses, test data and other detailed information on plasticizers manufactured by Ohio-Apex, Inc.

Equipment

Cells, Hydraulic **J278**
New 8-page bulletin describes and illustrates hydraulic cells ranging in capacity from 10,000 to 100,000 lb., and special cells from 40 lb. to 2500 tons. No. 288, Baldwin Locomotive Works.

Hardfacing **J279**
"The Economies of Hardfacing," a new reprint, reviews hardfacing and analyses problems of correct selection of rods, together with design and cost figures, and a bibliography. Air Reduction Sales Co.

Corrosion **J280**
Technical Bulletin T-3, on the resistance of monel, nickel and high-nickel alloys to corrosion by sulfuric acid, issued by The International Nickel Co., Inc., consists of 4 pages and touches upon problems involved.

Microscope **J281**
Bulletin gives details and specifications of new profile-measuring microscope for high-precision measuring and the control of profiles on the basis of enlarged drawings. Hauser Machine Tool Corp.

Pipe Markers **J282**
4-page bulletin describes self-adhesive Quik-Label pipe markers, and includes sample pipe marker. W. H. Brady Co.

Fan Heater **J283**
Schematic diagram and description indicates advantages of high-pressure steam fan heater. 2 pp., Bulletin No. 109, Niagara Blower Co.

Laboratory Facilities **J284**
Booklet suggests considerations in planning and procurement of laboratory facilities for hospitals, pharmacies, dispensaries, health centers. 15 pp., Laboratory Equipment Section, Scientific Apparatus Makers' Assoc.

Viscotrol **J285**
1-page bulletin describes new instrument for automatically and continuously controlling viscosity Brookfield Engineering Labs., Inc.

Mixer, Counter-Rotating **J286**
1-page bulletin is a description of the laboratory model counter-rotating mixer. Brookfield Engineering Labs., Inc.

Pump, Paper Stock **J287**
4-page bulletin features approximate dimensions and specifications of paper stock pump. Allis-Chalmers.

Timer, Cycle **J288**
1-page bulletin gives function, application, distinctive features and construction of cycle timer. R. W. Cramer Co., Inc.

Filter, Automatic **J289**
8-page bulletin describing specifications of automatic filter. Dollinger Corp.

Conveyors, Portable Belt **J290**
The versatility, adaptability and capacities of portable belt conveyors are outlined in the 8-page booklet. Barber-Greene Co.

Valves, Relief **J291**
4-pages show the application, detail, dimensions, installation and maintenance of forged steel relief valves. Bulletin 711, Edward Valves, Inc.

Reflectometer **J292**
"Description and Instructions on the Hunter Multipurpose Reflectometer," contains application, attachments and modification, operation and maintenance. Henry A. Gardner Lab., Inc.

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tility, control, production, costs, applications, specifications and dimensions of dielectric heaters. Bulletin 15B6431A, Allis-Chalmers Mfg. Co.

Transmitter, Liquid Level J294
4-page bulletin gives a presentation of construction, operation, applications and characteristics of liquid level transmitter. Taylor Instrument Co.

Turbines, Industrial J295
20-page booklet describes features, construction, enumeration of wheel sizes and contains guide to selection of turbines. B-3896, Westinghouse Electric Corp.

Roofing J296
The Bulletin, "Basic Application Data," lists suggested gauges for principal exterior building applications of the soft-temper Monel roofing sheet introduced last year, and contains information on the availability and relative cost of Monel roofing sheet. International Nickel Co., Inc.

Equipment, Laboratory J297
"Laboratory Equipment Bulletin No. 107," is a 4-page description of a laboratory lamp with interchangeable lamp tubes, a comparator set for urobilinogen determination and a portable, electric viscosimeter. Will Corp.

Equipment, Laboratory J298
"Industrial Waste Disposal" describes the application of the automatic pH Recording and Controlling Instruments and recording flowmeters to industrial waste disposal operations. Bulletin No. 138, Bristol Co.

Materials Handling Equipment J299
New bulletin describes all-electric lift truck, motorized pallets and power push-pull tractor. Barrett-Cravens Co.

Equipment, Process J300
24-page bulletin on high-pressure condensate return systems also contains data on steam flow conditions and heat exchange characteristics. Cochrane Corp.

Motors J301
Bulletin PB 5000-1, 4-pages, on low-speed, synchronous motors, explains construction features of the rotor and stator. Elliott Co.

Coil-Flex J302
1-page bulletin describes the use, composition and availability of fish tape in aluminum conduit. Catalog No. 31-081, Ideal Industries, Inc.

Connections, Electrical J303
8-page catalog shows the various types of welders, together with equipment requirements for formed terminal connections; connections to horizontal and vertical surfaces; "T" connections; and ground connections. Electric Railway Improvement Co.

Equipment, Laboratory J304
188-page catalog on scientific laboratory glassware and kindred items, contains descriptions of all types utility glassware needed by laboratories, hospitals, and experimental institutes. Daylite Vacuum Prods., Co.

Equipment, Process J305
Bulletin gives detailed explanation of the bevcolator and bevcolube, with features of various types of pails, batch cans and other stainless steel ware. Terriss Co.

Steels J306
Card TDC-122, on stainless Croloy steels for tubing, gives standard type numbers by which grades are identified, and chemical composition limits and ranges, based on ladle analyses. Babcock and Wilcox Co.

Instruments, Nuclear J307
36-page catalog of instrumentation for radioactivity measurement gives descriptions of instruments and accessories available, and also gives information about applications, manufacturing methods, and new instruments. Nuclear Instrument & Chemical Corp.

Switchgear J308
Construction features of modern metal-enclosed low-voltage switchgear and drawout air circuit breakers are described in an 8-p. Bulletin 18B6376A. Allis-Chalmers Mfg. Co.

Pallets J309
16-page catalog gives specifications, features, construction and capacity of all types of pallet lift trucks. Barrett-Cravens Co.

Apparatus, Glass J310
1-page bulletin describes the operations and control of apparatus for melting point determinations. Scientific Glass Apparatus Co., Inc.

Poles J311
18-page bulletin "Pole Buyers' Guide," presents service records, electrical resistance information, and comparative cost figures of pressure-creosoted poles. Koppers Co., Inc.

Outlet, Electrical J312
Bulletin features descriptions, use, specifications and availability of multi-outlet strip. Bulletin 140-11-49, 1 p., Eberbach & Son Co.

Steel J313
12-page Bulletin 125-5-47, gives information on knocked-down steel cubicles, cabinet design, control cubicles, instrument panel boards and electronic enclosing cases. Falstrom Co.

Rules, Slide J314
2-page bulletin gives specifications for log scale rules for industrial, engineering, and chemical use. Div-Rack Corp.

Insulation J315
4-page reprint, "Testing Varnished Insulation," describes an electrographic printing method suitable for testing both varnished paper and fabric. N. Y. University College of Engineering.

Knitted Mesh J316
Bulletin No. 11 concerns Separation as desired in must extraction, gas filtering, tower packing, cleaning and baffling with elements made of technical knitted mesh. 10 pp., Otto H. York, Inc.

Conveyor Belts J317
4-page folder featuring illustrated case studies of "Griptop" conveyor belt use. B. F. Goodrich Co.

Fire Extinguishers J318
Two bulletins, one of 4 pp., describing "Squeez-Grip" valve, the other of 12 pp. describing carbon dioxide extinguishing equipment and smoke detecting systems. C-O-Two Fire Equipment Co.

Valves, Pressure-Seal J319
Catalog 12-H gives designs, specs, ratings and charts for pressure-seal valves. Edward Valves, Inc.

Battery Maintenance J320
Gould Storage Battery Corp. offers reprints of technical articles on battery maintenance.

Insulation Testers J321
Bulletin 21-05-60, 8 pp., includes selection chart and hints on correct choice. James G. Biddle Co.

Instrumentation J322
"Instrumentation for Coal Hydrogenation Processing at the Bureau of Mines Demonstration Plant, Louisiana, Mo.," 20 pp. with diagrams and illustrations. Minneapolis-Honeywell Regulator Co.

Ammonia Booster Compressors J323
8-page bulletin, C-1100-B34, gives design features and specs of boosters for refrigeration plants. Worthington Pump & Machinery Corp.

Mixers, Vertical J324
Bulletin 39-B, 2 pp., illustrates and describes a new small-size "VA" vertical mixer. Sprout, Waldron & Co.

Milliammeters, Recording J325
Thorough discussion, with illustrations and charts, of Model AW recording milliammeters. Bulletin 549, 8 pp., Esterline-Angus Co., Inc.

Conductivity Cells, Bridges J326
4-page catalog describes electrolytic conductivity bridges and cells for laboratory use. Industrial Instruments, Inc.

Motors J327
20-page publication, E-M-S No. 26, on application of large synchronous and induction motors in pulp and paper mills. Electric Machinery Mfg. Co.

Weight Printer J328
Bulletin P1135, 12 pp., gives technical information about a device which records scale weights in print. Yale & Towne Mfg. Co.

Tube Cleaners J329
Mechanical air- or water-driven tube cleaners for small straight or curved tubes are described in Bulletin Y-24, 4 pp. Elliott Co.

Varnish Application J330
Bulletin 2263 describes the Zanderoll process for applying insulating varnish to electromagnetic windings. 19 pp., Power Piping Div., Blaw-Knox Construction Co.

Wire Rope J331
6-page folder answers anticipated questions about pre-formed wire rope. Macwhyte Co.

Motor Regulator J332
2-page bulletin, K-2001, describes voltage and current regulator. Wiring diagrams and illustrations are included. Reliance Electric & Engineering Co.

Belt Conveyor J333
Bulletin 220, 4 pp., describes a portable power belt conveyor that can be extended or retracted. Standard Conveyor Co.

Tube Cutter J334
Hand tools for precision cut-off of copper, brass, aluminum and steel tubing of 1/8" to 2" O.D. are described in Bulletin A44. Parker Appliance Co.

Dust Control J335
The Roto-Clone Type N hydrostatic precipitator is described at length in Bulletin 277A, 20 pp. American Air Filter Co., Inc.

Conveyor Belts J336
A 6-page catalog section describes construction and claimed advantages of The B. F. Goodrich Co.'s Cord conveyor belts.

Liquid Level Control J337
Bulletin PF479 describes a new liquid level control device. Photoswitch, Inc.

Water Hammer Arrestor J338
A 12-page booklet, "The Cause and Cure of Water Hammer," gives details of the ShokStop water hammer arrestor for water pump and piping systems. Wade Mfg. Co.

Face Shield J339
Bulletin CN-2, 1 p., describes vinyl plastic face shield. Mine Safety Appliances Co.

Welding Supplies J340
16-page catalog, first of a series, describes gas welding supplies. Indexed. Air Reduction Sales Co.

Soap Industry Equipment J341
Applications of clad steels in the soap industry are discussed in 8-pg. bulletin No. 492. Lukens Steel Co.

Lift Truck J342
Model 6-48 telescopic straddle-type high liftruck with 115" lift is described in Bulletin 168, 2 pp. Revolvator Co.

Insulation, Rock Cork J343
A mineral insulation especially valuable for refrigeration service is described in a 4-p. bulletin. Johns-Manville.

Elevators and Cranes J344
Bulletin 10482, 36 pp., gives full information and specifications on Barrett-Cravens Co.'s comprehensive line of elevators and portable cranes.

Chromium-Iron Alloy J345
Properties and characteristics of 27% chromium-iron are described in Bulletin TR-506, a 30-p. reprint of a technical article. Babcock & Wilcox Tube Co.

Thermometer, Cottonseed Sterilizer J346
The "Series 500" cottonseed sterilizer recording thermometer is described in Bulletin T841. The Bristol Co.

Miscellaneous

Packaged Plant Construction J347
Booklet describing a broadened concept of plant construction to effect savings both in time and money through centralized responsibility. 12 pp. Wigton-Abbott Corp.

Electrode Plant J348
Folder of 4 pages on Eutectic Welding Alloys Corp's. new electrode plant.

Chemicals J349
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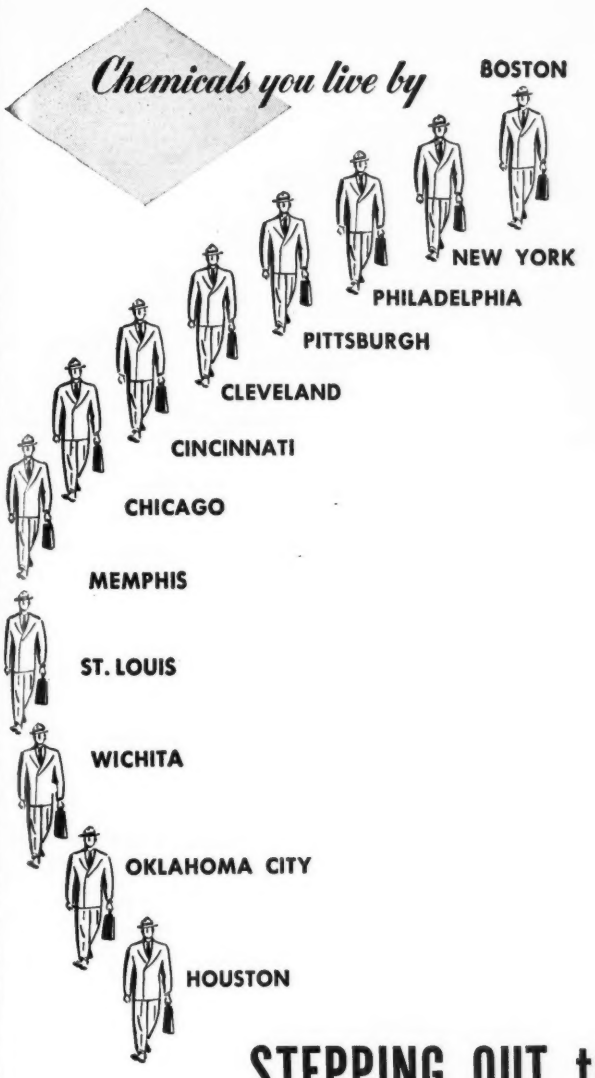

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Heyden chlorinated benzenes (benzols) are widely used in organic syntheses and have extensive applications in the manufacture of solvents, insecticides, textile chemicals, medicinals, weed killers, polishes, explosives, soil and sewage disinfectants, protective coatings, and many other industrial and commercial uses.

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Heyden Chlorinated Benzenes are shipped in seller's cars from our plant at Memphis, Tennessee: Tank cars and drums.

PROPERTIES

Appearance	Clear, colorless, heavy liquid
Odor	Characteristic, pleasant, aromatic
Boiling Point	180°C.
Freezing Point	—17° to —22°C.
Specific Gravity 25°/25°C.	1.303
Flash Point (closed cap)	160°F.
Solubility	0.01 g./100 g. water at 25°C.; Slightly soluble in alcohol; Miscible with most other organic solvents
Containers	Tank cars, approx. 86,000 lbs.; 55 gal. drums—550 lbs. net

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Benzoates
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Benzyl Chloride
Bromides
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Chlorobenzenes
Creosotes
Formates
Formaldehyde
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Guaiacols
Hexamethylenetetramine
M.D.A. (Methylene Disalicylic Acid)
Paraformaldehyde
Parahydroxybenzoates
Penicillin
Pentaerythritols
Salicylates
Salicylic Acid
Streptomycin

Serving Industry through Finer Chemicals . . .

Memphis, Tenn. plant of Heyden, where chlorinated benzenes and chlorine are produced.

FINE HEYDEN CHEMICALS

HEYDEN CHEMICAL CORPORATION
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Chicago 6: 20 North Wacker Drive • Philadelphia 3: 1700 Walnut St. • San Francisco 11: 420 Market St. • RUMFORD DIVISION: Rumford 16, R. I.

NEWS OF THE MONTH

Pennsylvania Salt Manufacturing Co.'s new $2 million fluorine chemical plant goes into its first operating phase this month at Calvert City, Ky. Sulfuric acid and hydrofluoric acid will be the initial products. As the demand for fluorine chemicals grows, future expansion is expected to make this plant one of the largest in the Pennsalt chain.

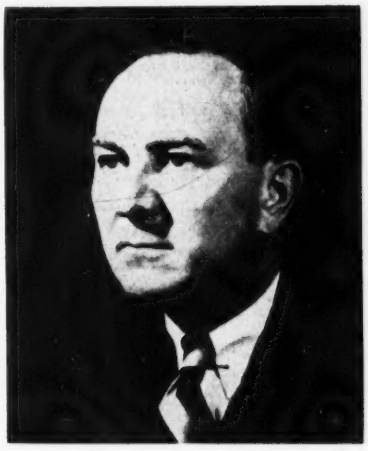
The plant area occupies about 10 acres of a 50-acre tract owned by the company. The Tennessee River, 800 yards away, supplies water necessary for manufacture of the acids, and economical transportation facilities. Tank cars of finished products will move on the Illinois Central Railroad.

A $1 million Institute of Microbiology will be built at Rutgers University with funds contributed by Selman A. Waksman, discoverer of streptomycin, from royalties on his streptomycin patent. Dr. Waksman, a member of the staff of the Rutgers College of Agriculture for more than 25 years, has assigned the patent to the university's Research and Endowment Foundation, and the net proceeds thereof will be used for research, particularly in microbiology. He will be the first director of the new institute.

E. I. du Pont de Nemours & Co., Inc., will build a $2 million finishes research laboratory in Philadelphia. Construction will begin soon, and the building is expected to be ready for occupancy late in 1950. In addition to research and development by the company, the laboratory will be available to users of Du Pont finishes to solve production problems.

Increased production of cold rubber has been made possible by conversion of facilities of the government plant at Lake Charles, La., which is operated by the Firestone Tire and Rubber Co. and the installation of necessary equipment at the government Borger, Tex., plant operated by the United States Rubber Co. Both plants were completed ahead of schedule to provide the new rubber that gives tire tread of superior wearing properties.

Newark, Cal., has been selected as the site of the new Pacific Coast phosphate operations of the Food Machinery and Chemical Corp. The plant will adjoin the magnesium oxide plant now operated at Newark by the Westvaco Chemical Division. The new plant is part of the expansion of phosphorus and phosphate production which involves the construction of a second electric furnace at Pocatello, Idaho, as well as an expansion of the Carteret, N. J., phosphate producing facilities. Construction schedules call for the new facilities to be in operation early in 1950.



T. S. Carswell, previously manager of Commercial Solvents Corp.'s Research and Development Department, has been named vice-president in charge of research and development.

Construction work on the high alpha cellulose pulp plant of Columbia Cellulose Co., Ltd., at Prince Rupert, B. C., was accelerated recently by establishment of two daily shifts. Engineering work on the project is well advanced and orders for long-dated equipment have been placed. The pulp mill being built on Watson Island, eight miles from Prince Rupert, is designed to produce 200 tons per day of high alpha pulp by the sulphite process.

A plant which will serve as a center for the nation-wide marketing and the packaging of magnesium anodes for corrosion control is being constructed in Tulsa, Okla., by Dowell, Inc., a wholly-owned subsidiary of The Dow Chemical Co.

A series of fires and explosions set off by an explosion of carbon disulfide being carried in a 16-ton trailer truck loaded in violation of tunnel regulations put one tube of the Holland Tunnel, which runs under the Hudson River between Jersey City and New York City, out of commission for 56 hours last month. Although the quantity of carbon disulfide one vehicle is permitted to carry through the tunnel is limited to 100 gallons, there were 4,400 gallons of the material in steel drums loaded on the truck.

Damage to the tunnel and to other vehicles was extensive, but there was no loss of life although over sixty people were injured. Investigations are under way to determine the cause of the explosion and what shipping regulations were violated. There is sentiment to make such violations constitute a felony instead of just a misdemeanor as is now the case.

The Girdler Corp., of Louisville, Ky., has negotiated a contract with Freeport Sulphur Co. to build a 40-ton-a-day sulphur recovery plant. This plant will produce elemental sulphur from hydrogen sulfide contained in waste gases from several process units of The Texas Co.'s Eagle Point Refinery at Westville, N. J. (*CI, Feb., 1949 p. 210*). The sulphur recovery plant will be located within the refinery limits but will be owned and operated by Freeport Sulphur Co. Primary purpose for building this plant is to minimize atmospheric pollution with sulphur-bearing gases, but the unit will produce a commercial product by a new process.

Young Soap Co., Philadelphia, will open a branch plant at the former wartime Bluebonnet Ordnance Plant near McGregor, Tex., for the manufacture of a general line of soap products and a number of chemical products. The company's bid for a former ammonium nitrate production plant at Bluebonnet has been approved by the War Assets Administration.

John L. Collyer, president of the B. F. Goodrich Co., speaking before the Detroit section of the Society of Automotive Engineers, stated that the British, Dutch and certain other nations are campaigning to get the United States to restrict production of synthetic rubber so that the price of crude rubber can be raised. He pointed out that the competition between the two types of rubber makes for maximum efficiency in production, and that our military security depends upon our synthetic rubber industry.

The Concord Chemical Co., Philadelphia manufacturer and jobber of chemicals and waxes, is starting construction on new offices and laboratories at Moorestown, N. J. The new buildings, built in the interests of greater efficiency and centralization of operations,

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is recommended for the

PURIFICATION

of a variety of chemicals . . . it acts as a specialized solvent and crystallization medium.

For example, fatty acids and alcohols containing 8 to 18 carbon atoms are infinitely soluble at 60°C. in Acetonitrile, but only slightly soluble at lower temperatures. The solubilities vary widely with slight changes in temperature permitting easy separation by fractional crystallization.

Acetonitrile may be used to extract the fatty acids and other impurities from linseed oil, cotton-seed oil and other fatty oils.

Many other compounds can be purified with this solvent because of its selective solvent power.

Acetonitrile is a stable, clear, colorless liquid with an aromatic odor.

Boiling Range . . . . 80-82°C.

Purity . . . . . 99% Min.

Specific Gravity at 20°C. 0.782-0.785

For further information write to

Sales Offices . .
922 Niagara Bldg. • Niagara Falls, N. Y.

are scheduled for completion August 1, 1949. The company at present has a manufacturing plant at Moorestown, and offices in Philadelphia.

Chemical companies report the following earnings on past operations:

Company	Net Income After Taxes First Quarter of 1949	1948
Celanese Corp. of America	$6,047,624	$9,743,930
Commercial Solvents Corp.	861,957	2,013,481
E. I. du Pont de Nemours & Co.	43,581,325	30,195,371
Freeport Sulphur Co.	1,236,227	874,672
Phillips Petroleum Co. and subsidiaries	12,713,254	18,154,148
Sterling Drug, Inc., and subsidiaries	4,323,963	4,161,747
United Carbon Co.	726,507	

	Nine Months Ending March 1949	1948
International Minerals & Chemical Corp.	4,135,734	3,250,810

The ECA Industrial Advisory Committee (the Humphrey Committee), appointed by ECA administrator Paul G. Hoffman to determine what capital equipment should be retained in Western Germany in the interests of European recovery, recommended that 34 of the 75 chemical plants considered be retained in whole; one be retained in part; and 40 be released for reparations. These recommendations served as the basis for the final intergovernmental agreement between the United States, Great Britain, and France which was in very close accord with these recommendations.

As part of a far-reaching program to improve and safeguard the nation's water resources, the new Water Pollution Control Advisory Board will hold a number of future meetings in different parts of the country and obtain first-hand information on the water problems of specific areas. While the Water Pollution Control Act passed by Congress last June authorizes Federal expenditures for loans and other assistance over a five year period, no specific appropriations have yet been made. Bills are pending, however, to make a start on the program during the fiscal year 1950.

The Procter and Gamble Co. will erect a new two-story research laboratory on 200 acres of land which it has purchased near suburban Venice, Ohio. However, construction is not expected to be started for some time, and estimate of the cost is not available. The laboratory will be completely equipped for basic studies of materials used in the manufacture of soap, synthetic detergents and vegetable shortening.

Grangemouth, Scotland, is one of keys in plans to make Britain self-supporting in petrochemicals and petroleum refining. In a scheme linking Imperial Chemical Industries, Ltd., the Anglo-Iranian Oil Co., Ltd., Scottish Oils, Ltd., and the Distillers Co., Ltd., in a coordinated program based on Middle East Oil, this city will be a major oil port. Work on a £12 million expansion of the present Scottish Oils refinery there is progressing rapidly. A new chemical factory is to be located alongside by British Petroleum Chemicals, Ltd., a combination of chemical and allied interests. ICI is expanding its dyestuffs plant in the area, and will build a new pharmaceutical plant.

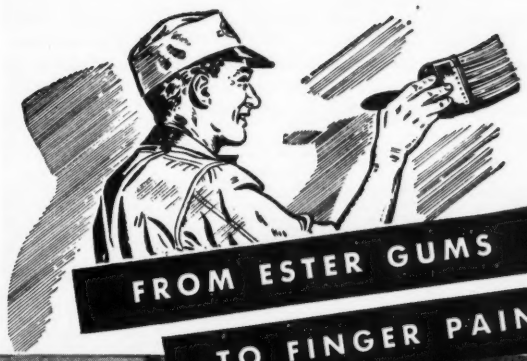
At Parthington, near Manchester, England, the first cracking furnace of the £4½ million Petrochemicals, Ltd., plant, which uses the Catarol process, has gone into production. A whole range of hydrocarbons are produced for processing into finished chemicals.

K. G. Voorhees, elected president and treasurer of Ungerer and Co. He has been executive vice-president since 1933.

The Du Pont Co. has discontinued manufacture of sodium hydride and has licensed Metal Hydrides, Inc., Beverly, Mass., to manufacture it under Du Pont patents. Du Pont said the agreement with Metal Hydrides has no bearing whatever on Du Pont's sodium hydride metal descaling process where the hydride is formed within the process from metallic sodium and hydrogen.

Armour and Co.'s Chemical Research and Development Department, directed by Victor Conquest, now reports directly to the president. He will be in charge of all scientific research and developmental activities for all divisions of Armour and Co. This represents a fundamental change in company organization, and chemical research and development are expected to play a larger part in company planning and policies.

Establishment of a Rubber Research Institute in the United States to help the American rubber industry retain its world leadership was urged by Harry L. Fisher, director of research of U. S.



FROM ESTER GUMS

TO FINGER PAINTS

Nothing takes the place of Glycerine

Each year, millions of pounds of glycerine flow into the manufacture of the staples of the coating industry: the alkyds . . . the ester gums. And each year, in hundreds of new applications over a wide range of products (finger paint is just one), glycerine demonstrates again and again its unparalleled versatility.

A trihydric alcohol, glycerine lends itself to numerous syntheses because of the easily controllable reactivity of its OH groups. Glycerine-based resins are readily manufactured with a minimum of variation from batch to batch.

Also, glycerine is a plasticizer . . . a humectant . . . a solvent. It resists oil and grease. It's immiscible with hydrocarbon solvents. It's an anti-freeze. Its combination of physical and chemical properties can be matched by no other product.

That's why for dependable performance in the coatings industry —or in almost any industry—*Nothing takes the place of glycerine!*

GLYCERINE PRODUCERS' ASSOCIATION
295 Madison Avenue
NEW YORK 17, N. Y.

Technical GLYCERINE NEWS

A CORROSION-RESISTANT COATING FROM CASHEW NUTS is said to produce a bond with iron, steel, and other metals so strong that it is practically impossible to separate. Secret of the unusually strong bond is a sublayer paint made from an alkyd resin, an important end-product of glycerine. (R-6)

★ ★ ★

NEW WATER-REMOVABLE PAINTS, described as glycerine-plasticized gluten dispersions, are said to be useful as temporary masks to keep sprayed paint off selected areas. (R-7)

★ ★ ★

WHY ALKYDS IN PRINTING INKS? A comprehensive report, published recently, in a leading periodical, discusses the reasons for the growing importance of alkyd resins in printing inks. Chief reason, given by the authors, is the improved properties—such as faster drying, greater scratch-resistance, and better "hold-out" —imparted to the inks by the alkyds. (R-8)

★ ★ ★

TABLE OF GLYCEROL VISCOSITIES NOW AVAILABLE. The research laboratories of the Glycerine Producers' Association have prepared a table of viscosities of glycerol in aqueous solution from 0 to 100 per cent, at from 0 to 100 degrees C. Copies may be obtained by checking item (R-9) on the coupon below.

★ ★ ★

AN IMPROVED ANTI-ICE PAINT for preventing ice formation and accumulation on various surfaces including aircraft propellers is said to be prepared by reacting glycerine and phthalic anhydride. It can be applied by spraying or brushing, the maker states. (R-10)

GLYCERINE PRODUCERS' ASSOCIATION, DEPT. 3
295 MADISON AVENUE
NEW YORK 17, N. Y.

I should like to know the source of those items appearing in Technical Glycerine News which I have checked below.

☐ R-6 ☐ R-7 ☐ R-8 ☐ R-9 ☐ R-10

NAME.....

COMPANY.....

ADDRESS.....

FOR SALE

AMYL SALICYLATE	50c lb.
DICALC. PHOSP. DIHYDRATE	5½c lb.
THYMOL CRYSTALS	$2.50 lb.
METHAMINE USP	23c lb.
MAGNESIUM METAL PDR.	15c lb.
2-4, DICHLORBENZOIC ACID	50c lb.
MERCAPTO BENZOTHIAZOLE	10c lb.
PYRETHRUM POWDER CONC. .45/45 Pyrethrins	14c lb.
PARIS GREEN	17c lb.
CARNAUBA WAX COMP.	17c lb.
AROCLOR, 1270	12c lb.
SILICA GEL	9c lb.
HYDROQUINONE	70c lb.
RED. PRUSS. POTASH	51c lb.
POT. METABISULF. ANH., 1 lb. bt.,	12c lb.
RED SQUILL 500/600 mg/kg	$1.00 lb.
ALUMINA HYDRATE	12c lb.
SULFAGUANIDINE, 1 lb. bt.	$3.85 lb.
SULFAGUANIDINE TABLETS	$3.15 M
SULFADIAZINE SODIUM	$15.00 lb.
SULFAPYRIDINE TABLETS	$4.50 M
BISMUTH SUBCARB. TAB. 500's	35c bt.
HEMATOXYLIN CP 10 gm. bt.	$1.00 ea.
SODA FLUORIDE WH. 1 lb. bt.	8c lb.
DIMETH. PHTHALATE	18c lb.

OTHER ITEMS—SEND INQUIRIES

Chemical Service Corporation

EST. 1925

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HUNTING FOR GLYCERINE?

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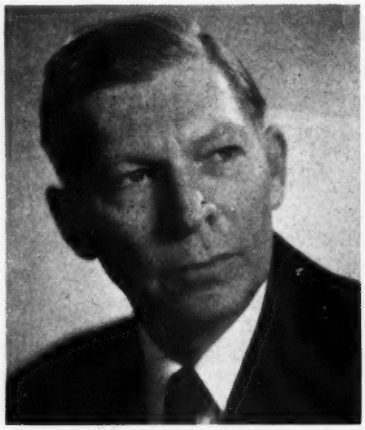
ARMOUR *Glycerine Division*

Armour and Co., 1355 W. 31st St., Chicago 9, Ill.

Industrial Chemicals, Inc., on the occasion of his receiving the Charles Goodyear Medal of the American Chemical Society's Rubber Division for his outstanding achievements in rubber chemistry.



Everett S. Bissell, named vice-president in charge of sales, research laboratories, chemical engineering and process engineering, The Patterson Foundry & Machine Co. He has been vice-president and general manager of Mixing Equipment Co.

Millmaster Chemical Corp. has been appointed exclusive selling agent for F. W. Berk & Co., Inc., manufacturers of mercury and zirconium products. Robert J. Milano becomes president of the new corporation which succeeds Millmaster Chemical Co. The new organization has moved from 551 Fifth Avenue—its location for the past thirteen years—to take over the sales offices of Berk at 420 Lexington Avenue, New York City.

Reichhold Chemicals, Inc., has expanded its overseas manufacturing facilities to assure customers in Western Europe an increased supply of RCI resins. Under arrangements concluded this year, RCI synthetics will be produced in Holland by Kunstharsfabriek Synthese N. V., located at Rijksstraatweg 31, Sassenheim. Resins will be manufactured from the same formulae employed at Reichhold plants in the United States.

Koppers Company, Inc., has contracted to purchase the Freyn Engineering Co., Chicago, Ill., an engineering firm specializing in design and construction of blast furnaces and open hearth furnaces, and in the engineering of mills, power stations, and other steel mill facilities. The acquisition also will include the Open Hearth Combustion Co., a Freyn subsidiary. The purchase is to be consummated through the exchange of Koppers common stock for the stock of Freyn Engineering. Freyn will continue under its present name, and for the time being will be operated as a wholly-owned subsidiary of Koppers. There will be no changes in policies or personnel.

CALENDAR *of* EVENTS

AMERICAN CHEMICAL SOCIETY, 116th national meeting, Atlantic City, N. J., Sept. 19-23.

AMERICAN COUNCIL OF COMMERCIAL LABORATORIES, annual meeting, Curtis Hotel, Minneapolis, Minn., June 23-24.

AMERICAN ELECTROPLATERS' SOCIETY, annual convention, Hotel Schroeder, Milwaukee, Wis., June 27-30.

AMERICAN LEATHER CHEMISTS ASSOCIATION, 1949 convention, Hotel Monmouth, Spring Lake, N. J., June 22-24.

AMERICAN SOCIETY FOR TESTING MATERIALS, 52nd annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J., June 27-July 1.

COMMERCIAL CHEMICAL DEVELOPMENT ASSOCIATION, open meeting, Niagara Hotel, Niagara Falls, N. Y., June 24.

HEAT EXCHANGE INSTITUTE, Skytop Lodge, Skytop, Pa., June 29-July 1.

HEAT TRANSFER AND FLUID MECHANICS INSTITUTE, 2nd annual meeting, Berkeley campus, University of California, June 22-24.

INSTITUTE OF FOOD TECHNOLOGISTS, annual meeting, San Francisco, Cal., July 10-15.

INSTITUTE OF TRAFFIC ENGINEERS AND AMERICAN SOCIETY OF SAFETY ENGINEERS, 11th annual Western safety conference, Multnomah Hotel, Portland, Oregon, June 26-29.

NATIONAL ASSOCIATION OF PURCHASING AGENTS, annual international convention and Inform-a-Show, Chicago, June 20-22.

SECOND PACIFIC CHEMICAL EXPOSITION, San Francisco, Nov. 1-5.

SOCIETY OF CHEMICAL INDUSTRY, 68th annual general meeting, Manchester, England, July 11-15.

TWENTY-SECOND EXPOSITION OF CHEMICAL INDUSTRIES, Grand Central Palace, New York City, Nov. 28-Dec. 3.

Construction of a million dollar building, the new home of the University of Minnesota's chemical engineering division, was started recently on the Minneapolis campus. The new building will be a five-story, factory-type structure 200 feet long by 60 feet wide. It will provide 20 research laboratories, six instructional laboratories, offices, class rooms, drafting rooms and shops for the chemical engineering division.

Celanese Corp. of America has completed arrangements with three Far Western firms to handle distribution of its organic chemicals on the West Coast. Mefford Chemical Co., Los Angeles, will distribute Celanese chemicals for Southern California and Arizona. L. H. Butcher Co., San Francisco, and Carl F. Miller & Co., Seattle, will distribute the corporation's chemicals in their respective territories. Sherwin-Williams Co. in Oakland has been handling the distribution of Celanese acetic acid on the West Coast for the past three years.

The Phillip E. Calo Co., Chicago, has been appointed sales representative for the Chemical Division of General Mills, Inc., to cover the Chicago area, including Rockford, Ill., and South Bend and Elkhart, Ind. It will handle General Mills' complete line of vegetable, animal, and marine fats and oils as well as

Shown here is one view in the spotless modern plant where Swift's Animal Protein Colloid is made. Operation is continuous, automatic . . . the product is "untouched by human hands," not contaminated by foreign substances.

Investigate this Modern Process Agent:

Swift's Animal Protein Colloid*

(made from an exclusive Swift Process)

Does your manufacturing process require . . .

1. An emulsifier?
2. A flotation agent?
3. A gel structure?
4. A settling agent?
5. A protective coating?
6. A sizing agent?
7. A carrier of pigments?
8. An impregnating agent?
9. A base for pigment?
10. An oilproofing agent?
11. A flocculating agent?
12. A clarifying agent?
13. A filtering agent?
14. A stiffening agent?
15. A mordant?

This modern process agent, Swift's refined Animal Protein Colloid, has properties which may be employed in a wide number of processes. Even though you have used other processing agents, be sure you investigate Swift's Animal Protein Colloid now. It has unusual properties. It may meet the requirements of your present operations or help in developing new ones.

Commercially high quality bone glue.

What is this modern process agent?

Swift's Animal Protein Colloid is made by an exclusive Swift process. Protein liquor is extracted from bones and highly concentrated. This pure liquid falls on a bed of dry finished product which adheres evenly to the droplets. Then, by continuous and automatic schedule, these droplets travel through driers and are milled and screened. This whole operation is under *precise synchronized control* and is completed in relatively short time.

The result is a uniform granular form that goes into solution rapidly. It's a purified product, light amber in color.

Because plant and machinery are kept spotlessly clean — the finished product does not touch material which can contaminate it with foreign substances . . . because of the precise control possible with Swift's exclusive process, Swift can bring you this *superior* processing agent. And Swift's Animal Protein Colloid has the same high quality and uniform characteristics the year 'round.

Swift's technical service yours, investigate now

Write or phone for one of Swift's special representatives. He will call and discuss Swift's Animal Protein Colloid with you. This process agent may be just what you are looking for. Write to:

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ADHESIVE PRODUCTS DEPARTMENT

4109 Packers Avenue, Chicago 9, Illinois

all organic chemical derivatives for the protective coating and allied fields.

The Koppers Chemical Division of Koppers Company, Inc., has opened a New England District sales office at 250 Stuart Street, Boston, Mass. The new district will consist of all of New England in addition to a portion of New York State bounded by Kingston, Binghamton, and Syracuse.

Mathieson Chemical Corp. will move its headquarters offices from New York to Baltimore, and has formed a realty partnership with the Baltimore National Bank to purchase the 34-story O'Sullivan Building there. Mathieson will occupy about three floors of the building, which will be known as the Mathieson Building, and executive headquarters will be moved there by degrees.

PERSONNEL

Company Officers

• Dow Chemical of Canada, Limited, has elected Calvin A. Campbell, Donald Williams and Ralph M. Hunter to its board of directors. All three men hold key positions with The Dow Chemical Co., of which Dow Chemical of Canada is a subsidiary.

Concurrently, Mr. Williams was elected a vice president of the Canadian company and Mr. Campbell was elected secretary to replace Leland I. Doan who resigned the post in view of his recent election to the presidency of the parent company.

• Wyandotte Chemicals Corp. has elected the following officers:

E. M. Ford, president; Ford Ballantyne, vice president and treasurer; Ford Ballantyne, Jr., secretary and assistant to the president.

• S. C. Ogburn, Jr., who last year joined Foote Mineral Co. of Philadelphia, as manager of research and development has been appointed a director of the firm.

• D. P. Morgan has been named vice president and treasurer of Mathieson Chemical Corp. succeeding Howard Berry who is retiring. Dr. Morgan has been vice president in charge of the development department since joining the company in 1948.

• Arthur C. Boylston, president of the Mallinckrodt Chemical Works of St. Louis, died recently of a heart condition.

ISCOOPERATION News

JUNE, 1949

Isco Locust Bean Gum in Your Process Gives Best Results at Lower Cost

Composition: Corresponds to molecular combination of Galactomannan and Mannon; regarded as a hemicellulose.

Properties: Remarkable colloidal adhesives and protective properties. Enormous water absorbing power. Three to twenty times the swelling power of usual gums or starches. Obtained by refinement and special treatment of selected Locust Bean Kernels. Offered as tasteless and oderless white powder.

Millings: Offered in four different millings, 50 mesh, 100 mesh, 150 mesh, and 175 mesh.

Special Features: Isco Locust Bean Gum is more efficient because of the uniformity of its grindings.

Write, wire or phone for samples and informative booklet.

Gum Arabic • Gum Tragacanth
Gum Karaya • Gum Ghatti
Irish Moss • Absorption Bases

"You'll Like ISCOOPERATION"

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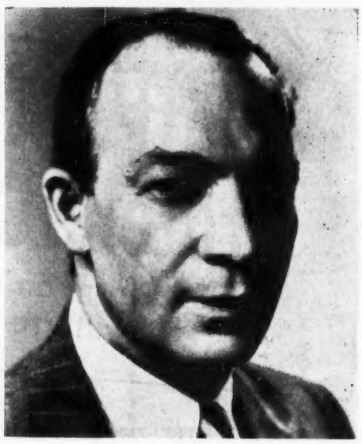


L. C. Cartwright, appointed secretary of Foster D. Snell, Inc. He will continue to be account executive of the firm, with which he has been associated since 1936.

Production

• C. H. Madsen has been appointed plant manager of the synthetic rubber plant operated by U. S. Rubber Co. at Borger, Tex. He was plant manager for Canadian Synthetic Rubber Co., Ltd., Sarnia, Ont.

• William J. Boegly has been appointed as director of the Pharmaceutical Manufacturing Department at the Rensselaer, N. Y. plant of Winthrop-Stearns, Inc.

Mr. Boegly, former plant manager at Frederick Stearns & Co. in Detroit, has been acting as service engineer for Winthrop-Stearns manufacturing operations.

Sales

• W. Kenneth Menke of St. Louis has been appointed assistant general manager of sales for the Merrimac Division of Monsanto Chemical Co. For the past two years he has been assistant director of the company's Development Department.

• Lawrence R. Sperberg has been named manager of market research evaluation in the Philblack sales division of Phillips Chemical Co., a subsidiary of Phillips Petroleum Co. He has been manager of the research evaluation and testing sec-

WHY

it will pay you to investigate..

DAVISON

Custom-Made Catalysts

FACILITIES—Davison has added to established facilities a new plant specifically designed for the production of custom-made catalysts . . .

EXPERIENCE—Davison was one of the pioneers in the commercial development and production of catalysts . . . the background for today's continuing research and development.

SERVICE—Davison will work with you in developing special catalysts for your particular process.

Davison has cooperated in the development, and is now producing, custom-made catalysts for many of the world's largest users. Now, for your particular process, Davison is in a position to develop catalysts along widely diversified lines using silica gel, pumice, asbestos, or many other supporting materials which are surface impregnated with catalytically active components. Whether you measure your requirements in pounds or tons, bringing your catalyst problems to Davison can pay off in time and money. Your inquiry to Technical Service Department will put Davison experience to work for you.

Davison
custom-made
Fluidized
or
Pelletized
Catalysts

THE DAVISON CHEMICAL CORPORATION

Progress through Chemistry

BALTIMORE-3, MD.

tions of the chemical division in Phillips research department.

• William F. George, New York District sales supervisor since 1942 has been named New York District sales manager for the Hooker Electrochemical Co. He will continue his headquarters at the New York Office at 60 East 42nd Street.

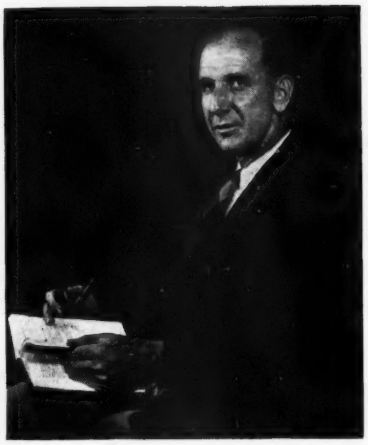
Mr. George was at one time connected with Hooker at the Niagara Falls plant and later in the New York sales office. In 1919 he left to organize the firm of W. F. George Chemicals, Inc. which business he conducted until 1928 when he went with Chemical Industries magazine.

Research

• Marlin T. Leffler, formerly head of the organic research department at Abbott Laboratories, has been appointed assistant director of research. Marvin A. Spielman, formerly a group leader in organic research, has been named to succeed Dr. Leffler as head of the organic research department.

• Max H. Thornton has been appointed chairman of the Chemical Research Division of Midwest Research Institute. He joined the staff of the Institute in 1945 during the first year of its operations.

• W. A. Schmidt, of the Central Research Laboratory staff of General Aniline & Film Corp., has been named Research and Development Coordinator for the company's Ansco and Ozalid Divisions. Dr. Schmidt has directed the photographic research section at the Central Research Laboratory at Easton, Pa., since 1942.



Richard E. Shope, who has joined The Merck Institute for Therapeutic Research as associate director. He was formerly with the Rockefeller Institute for Medical Research.

• Austin M. Patterson of Xenia, Ohio, retired vice-president of Antioch College and one of the world's foremost authorities on chemical terminology, has been chosen to receive a new Award in the Documentation of Chemistry, sponsored by the Dayton Section of the American Chemical Society.

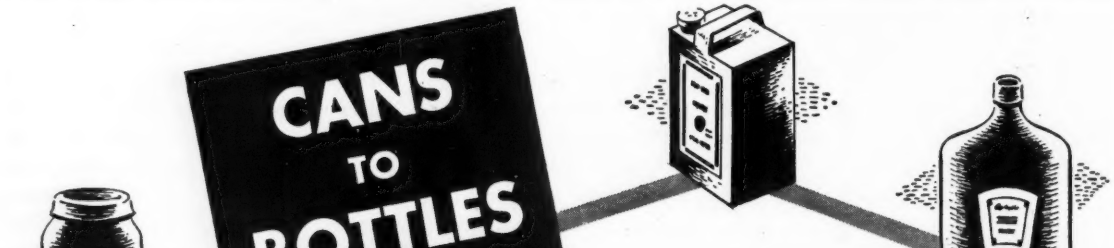
Dr. Patterson, for the past 45 years chemical editor of Webster's Dictionary, was a founder and at one time editor-in-chief of "Chemical Abstracts," an American Chemical Society publication which serves as a guide to the chemical literature of the world.

Associations

• R. M. Burns, chemical director of the Bell Telephone Laboratories, has been elected chairman of the New York Section of the American Chemical Society. He will take office on July 1, succeeding Clifford F. Rassweiler, vice-president for research and development of the Johns-Manville Corp.

• The American Institute of Chemists elected the following new councilors at its annual meeting: Councilor for one year term: Roy H. Kienle, director of application research, Calco Chemical Division of American Cyanamid Co.; Councilors for three-year terms: Donald Price, technical director, Oakite Products, Inc., Charles P. Neidig, Chemical Products Division, Atlantic Refining Co., and Charles C. Concannon, chief of Chemical Division, Bureau of Foreign and Domestic Commerce.

• American Oil Chemists' Society elected the following officers at its annual meeting: president, V. C. Mehlenbacher, Swift and Co.; vice-president, J. R. Mays Jr., Barrow-Agee Laboratories, Inc.; members-at-large, A. E. Bailey, Girdler Corp., T. H. Hopper, Southern Regional Research Laboratory; L. B. Parsons, Lever Brothers Co.; secretary, H. L. Roschen, Swift and Co.; treasurer, J. J. Vollertsen, retired in 1946 from Armour and Co.



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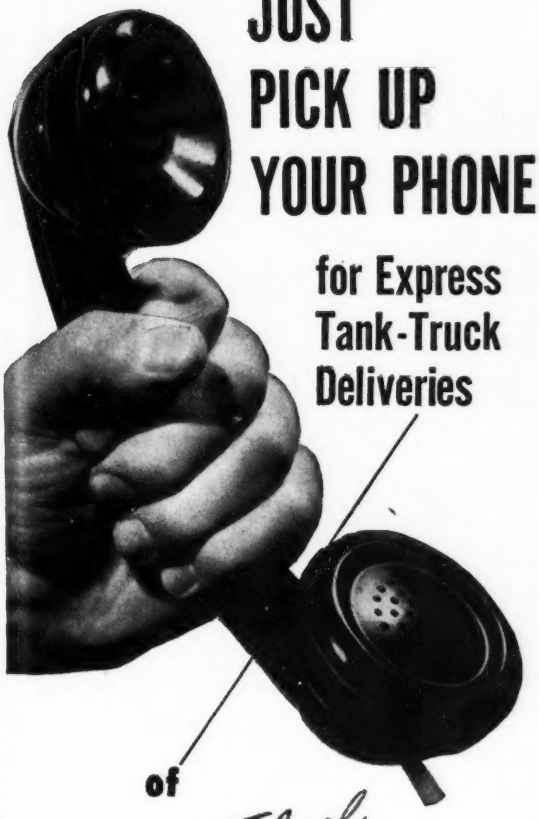

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CHEMICAL SPECIALTIES

A department devoted to news of the chemical specialties field. Descriptions of new specialty products will be found in the New Products & Processes department.

Laundry, Cleaning Aids Developed by Pennsalt

Pennsylvania Salt Manufacturing Co. has developed two new products, Sparkette, a different and complete detergent for laundry operation and Erusto Energex, an energized de-soiler for dry cleaning.

Sparkette is a granular detergent that dissolves and works readily in hot, cold, relatively hard, or soft water. Neither soap nor alkali is needed because it has a higher alkalinity than most complete detergents now on the market. It consists of penetrating, suspending and foaming agents and contains no clay or synthetics.

Usable in all types of petroleum or synthetic solvents, Erusto Energex is said to loosen and suspend dirt in the dry cleaning process and to have the desirable qualities of many products now sold as soaps, detergents, concentrates and emulsifiers.

Pennsalt has produced bulletins describing the composition and use of these new products. They may be obtained by writing Laundry and Dry Cleaning Division, Pennsylvania Salt Manufacturing Co., 1000 Widener Building, Philadelphia.

Lion Introduces Line of Petroleum Products

The newly organized Protective Coatings Department of the Lion Oil Co. is introducing on a nation-wide scale a complete line of new petroleum products under the trade name, Nokorode. The new line includes several grades of government-approved rust preventives, various industrial mastics, car cement and insulating compounds for the railroad trade and a variety of specially processed and compounded industrial rust preventives.

Nokorode products are being manufactured in the newly-built $250,000 plant addition to the Lion refinery at El Dorado, Ark.

Canadian Aniline Opens New Plant

Canadian Aniline & Extract Co., Ltd.'s, new plant for the manufacture of mono-, di- and triethanolamine has recently gone into production. The tri product is immediately available in commercial quantities and it is expected that very shortly the mono and di will be available.

In addition to the ethanolamine types, the company's production of non-ionic, wetting agents, emulsifiers and detergents is expanded. The company is also producing various salts and condensation products of the ethanolamines. Among the important materials available is triethanolamine phosphate, an anti-corrosion additive for all types of cooling liquids used in internal combustion engines; the product is soluble in water, alcohol, glycol and glycerine.

Allyl Starch Available In Larger Quantities

Allyl starch, introduced to industry in 1947, is now available in semi-commercial quantities from General Mills Inc. General Mills has expanded pilot plant manufacture of the product and is now offering 55-gallon drums of allyl starch in lacquer solvent, technical ethanol or toluene-isobutanol. Climaxing an intensive development and field evaluation program, the company is, for the first time, making available a specially-compounded, allyl starch baking formulation that is highly water and heat resistant.

Since its introduction allyl starch has found a place in such industrial products as printing inks, specialty adhesives, overprint varnishes and heat-resistant oven finishes. The heat-resistance of allyl starch has created interest in the product for finishes on automobile exhausts, automobile and diesel engines, steam radiators, oil refinery equipment, and metal smoke stacks. Application tests have shown its value in linoleum, shellac substitutes and in oil- and solvent-resistant surface coatings for furniture, home appliances and other metal and wood surfaces.

Non-Silicated Cleaner For Metals

The Hanson-Van Winkle-Munning Co., Matawan, N. J., has developed a new cleaner, an addition to its extensive line of these materials. This new cleaner, Matawan #25W, is a non-silicated soak or electro-cleaner especially suitable for applications where the presence of a silicate in the solution would interfere with subsequent processing. It is similar to Matawan #25, with a wetting agent.

Matawan #25-W may be used as a soak or electro-cleaner on steel, copper, brass, lead base castings or die castings. Reverse electro-cleaning may be used on steel to secure smut-free surfaces. The concentration recommended is 3 to 8 oz./gal. The higher concentrations are recommended for steel.

Temperature range is 160° to 200° F. Immersion time for soak cleaning is 3 to 5 minutes. Immersion time for electro-cleaning is 30 sec. to 3 min.

E. F. Houghton Establishes New Department

A new product development department has been established by E. F. Houghton & Co., manufacturer of industrial oils, chemicals and leathers. The department is set up to facilitate handling and evaluation of newly developed products, and to bring about closer liaison between the research, production and sales staffs.

H. B. Walker has been named manager

H. B. Walker

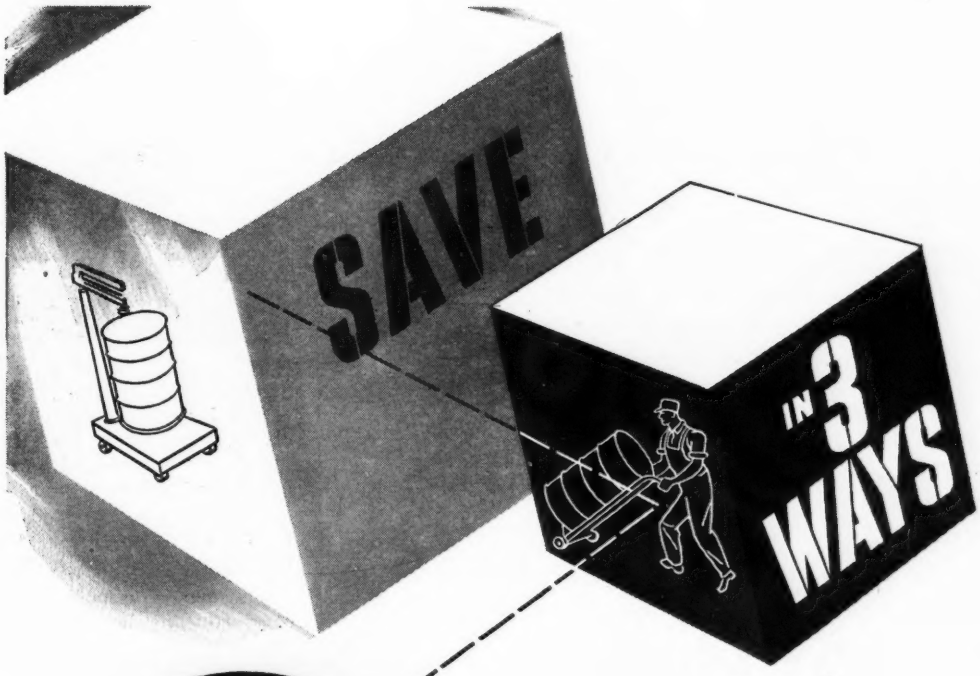
of the new department. He has been with Houghton for two years during which time he was assistant to R. H. Patch, vice-president — operations. In that capacity he directed application research and supervised production and engineering problems for the company.

Glidden Develops Two New Enamels

The Glidden Co. is offering two new interior paints, called Number 45 Professional Enamel and Number 47 Flat Finish, which are claimed to provide large cost savings to the painter. Outstanding features of Number 45 Professional Enamel are its extremely easy brushing, hold-out properties that eliminate reinforcing of undercoating by the painter, and a wet edge that will hold for 20 to 30 minutes, eliminating lap marks. It is produced only in white, but can be tinted easily.

The companion paint, Number 47 Professional Flat Finish, is a non-porous flat finish that can be used over porous surfaces. It brushes easily, does not require a primer, has an eggshell sheen and can be washed and stippled. Because Number 47 also holds a wet edge for 20 to 30 minutes, it will not flash or show lap marks when properly applied to average surfaces.

By combining these two new paints, a painter can do the work formerly accomplished with five different paints. Number 47 eliminates the need for a primer and is perfect for a flat wall finish. Number 45 serves as an enamel under-



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But what's more, you save on shipping expense. When you buy the Anhydrous form you don't pay freight on useless water — all you get is what you use — uniform, pure Anhydrous Citric Acid, the preferred acidulant. Third — but of importance to quantity users — is the saving in storage and handling charges. By using Anhydrous you save storage, handling, and mixing charges on one drum in every eleven drums used.

And it's no problem to switch from the U.S.P. to Anhydrous form. Just ask us for a conversion chart when sending in your order to Pfizer — the world's largest manufacturer of Citric Acid. Chas. Pfizer & Co., Inc., 630 Flushing Ave., Brooklyn 6, N. Y.; 211 E. North Water Street, Chicago 11, Ill.; 605 Third Street, San Francisco 7, Calif.

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coat. By mixing the two, the painter can get semi-gloss and eggshell finishes.

Adhesive Group Seeks Members

Committee D-14 on Adhesives, of the American Society for Testing Materials is anxious to have those interested in adhesives attend future meetings and participate in its work. This committee embraces the entire field of adhesives and is not limited to any special group of the more widely used materials. At present the committee membership consists of 32 consumer members, 36 producer members and 17 general interest members.

The development and approval of several tentative standard test methods has already been achieved. Tensile properties, the peel or stripping strength and applied weight per unit area are covered in standard methods. Resistance of adhesive bonds to chemical reagents is another standard, and the effect of light on permanence has been covered in a test. A series of definitions of terms has been standardized. Work on additional procedures, methods, specifications and other objectives of the committee is progressing very satisfactorily. Those concerned with attaining some uniformity of procedure or practice for their phase of the adhesive industry, are invited to participate in the activities of Committee D-14. The next meeting of this committee is scheduled for early October, 1949, in Philadelphia, Pa. Further information can be obtained from the A. S. T. M. Headquarters, 1916 Race Street, Philadelphia 3, Pa.

H. C. Stecker, who has organized Stecker Chemicals, Inc., Ridgewood, N. J., for the manufacture and sale of chemical specialties. He was formerly with the chemical sales division of Edwal Laboratories.

Celanese Selling Solvent For Boat Motor Sludge

Difficulties in motor starting which bother boat enthusiasts every spring can now be eliminated by a solvent called Lindol H.F. This material, produced by the Chemical Division of Celanese Corp. of America, dissolves the resinous deposits (or lacquering) which form on pistons, rings, valves, and bearings, etc., over the winter storage.

Application consists of putting one or two ounces of Lindol H.F. into each cylinder through the spark plug hole and allowing the motor to stand an hour or so after having been turned over a few revolutions by hand. This procedure will dissolve these deposits and permit free operations of moving parts with full normal compression.

Lindol H.F., an oily chemical compound, is an advantageous wear reducing motor oil additive, and has been used as such for many years by major refiners. It is available in one, five and fifty gallon drums. Distributor arrangements with boating equipment suppliers are being developed.

Radioactivity Aids Detergency Tests

Monsanto Chemical Co. is using radioactive chemicals in experiments evaluating the company's synthetic detergents as metal cleaners. The new method utilizes C-14, an atomic energy by-product which emits beta rays, or electrons. It can detect traces of soil beyond the sensitivity of even the most refined of present methods which depend on physical measurements.

In the experiment, one inch circular

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Antara Extra

An Antara Products Publication

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Emulsifiers
Wetting Agents
Dispersants
Carbonyl Iron Powder

444 MADISON AVENUE NEW YORK 22, N. Y. JUNE, 1949

Antaron "L-520" Ideal for Hard Surface Spray Washing

Antaron "L-520" – a new addition to Antara Products Antaron line – was recently announced as one of the outstanding detergents for hard surface spray cleaning.

This product is a low-foaming alkyl amide sulfonate which can, if necessary, be built to give superior results in hard surface spray cleaning at elevated temperatures. Its wetting ability and detergency are excellent.

The low-foaming properties of Antaron "L-520" overcome the defects of products whose abundance of foam prevents good detergency. Antaron "L-520" plus hard water without water softening polyphosphates leaves surfaces which are film free. This elimination of a water softening polyphosphate makes it possible to compound products at a lower overall cost which will be better detergents.

Antara Products has a specially-formulated product, Antaron "L-511", which is built specifically for automatic dishwashing. Full information on Antaron "L-520" or Antaron "L-511", the special dishwashing machine detergent, may be had by writing Antara Products.

Investigate Antaron "L-511" for Machine Dishwashing

Simple Mixing Makes Possible Incorporation of Liquid Non-Ionics With Suitable Solid Products

Now through a development of the Central Research Laboratory of General Aniline & Film Corporation it is possible to incorporate liquid non-ionic detergents of the Antarox "A" series with inorganic powders through a simple mixing process at a low cost.

It has been known for some time that liquid non-ionics, in combination with certain inorganic builders, can be spray or drum dried to yield non-sneezing products of desirable physical form and highest quality.

This new discovery of General Aniline & Film Corporation enables compounders of powdered soap and detergent products who lack the expensive spray or drum drying equipment to use these versatile, efficient, and economical liquid non-ionic detergents. It means that hundreds of small outfits *now* can incorporate these detergents with their own powdered products and put more efficient cleaners on the market at a lower cost.

Write Antara Products today for more information.

Add Two New Products To Antarox "A" Line

Antarox "A-400" and "A-480" have just been added to Antara Products' Antarox line. Both of these products are aromatic polyethylene glycol ethers. A unique characteristic of these detergents is that they are practically odorless. Their foaming qualities make them particularly valuable for the demands made upon some detergents.

Antarox "A-400" and "A-480", because of their ether structure, are extremely stable in the presence of acids, alkalis, and electrolytes. Because they do not ionize, they will not form insoluble compounds in hard water. They do not easily decompose or separate and will withstand wide variations in temperature. In addition to all these characteristics, their physical and chemical properties will not change over long storage periods. Information on Antarox "A-400" and "A-480" may be had by writing Antara Products.

Prices Reduced on Antarox "A" Series

Antara Products, General Aniline & Film Corporation announced last month a price reduction of three cents a pound on the Antarox "A" series. These products are non-ionic synthetic detergents of the aromatic polyglycol ether family and are excellent detergents, wetting agents, dispersing agents, and emulsifying agents with many and varied applications throughout industry.

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DESCRIPTION:
A white crystalline solid available in semi-commercial quantities.

Properties of Pure Compound:
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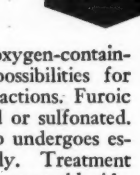
Melting Point, °C. 133
Dissociation Constant ..... 7.1×10^{-4}

Solubility:
Furoic acid is soluble in hot water, sparingly soluble in cold water, soluble in alcohol, and insoluble in paraffinic hydrocarbons.

Chemical Reactivity:
Furoic acid presents a furan nucleus in a highly storage-stable form, yet substitution occurs readily in the 5-position. Its conjugated double bonds and oxygen-containing ring present possibilities for other interesting reactions. Furoic acid can be nitrated or sulfonated. The carboxyl group undergoes esterification smoothly. Treatment with phosphorus pentachloride, thionyl chloride or phosgene produces furoyl chloride.

Literature:
Reaction Chart No. 3, Data Sheet 101A and samples are available when requested on your business letterhead. Write to nearest office.



The Quaker Oats Company CHEMICALS DEPT.
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NEW YORK, 1232 R WHITEHALL BLDG., N. Y. 4, N. Y.
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pans of sheet steel and stainless steel were "soiled" with a fixed amount of lubricating oil containing a minute quantity of C-14. The number of electrical charges given off were recorded with a Geiger counter. Then the pans were cleaned with 5 per cent of the company's Santomerse No. 1 plus 95 per cent anhydrous sodium metasilicate.

The tell-tale charges before cleaning were approximately 100,000 a minute. After cleaning they were as low as two counts a minute, indicating that most of the "soil" had been removed. Complete removal was not possible, because some of the radioactive material became part of the metal.

Methods formerly used for detecting soil such as gravimetric, degreasing and fluormetric, often indicated "clean" pans while the tracer method still revealed the presence of dirt. The new method is estimated to be a thousand times as sensitive as other methods now used. Such sensitivity is particularly important in metal cleaning, where undetected trace amounts of dirt may interfere with proper electroplating or similar operations and result in later defects.

Innis, Speiden Acquires Subsidiary

Innis, Speiden & Co., New York City, has acquired as a wholly-owned subsidiary, E. S. Browning Company, Inc., of San Francisco and Los Angeles, Calif. E. S. Browning Co., Inc., which represents a large number of chemical manufacturers, will continue to operate under its own name but will sell, in addition to its own line, all of Innis, Speiden's chemicals, gums, waxes and insecticides. Edgar S. Browning remains as president and general manager of the California firm.

Monarch Switches Name

Monarch Soap & Chemical Co., Minneapolis, Minn., has changed its name to Monarch Cleaning Chemicals, Inc. Reason for the switch is that the new name more aptly describes its business, which is the manufacture and sale of cleaning and sanitizing materials for the dairy industry.

Airosol Plant Sold

Manufacturing facilities of the Airosol, Inc., plant at Neodesha, Kansas, have been purchased by John Matthews who will continue the manufacture of Airosol brand DDT dispensers and jet dispensers. He plans for eventual expansion of the line to include bomb sprays for fumigation, deodorants, floor waxing, interior painting and medicinal products.

The Airosol Co. was organized by W. J. Small in 1945 to manufacture airosols for the government during the war.

(Turn to page 1031)

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BUTYL "CELLOSOLVE"* STEARATE • METHYL "CELLOSOLVE" OLEATE
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CHEMICAL MARKETS

Foreign Recovery Threat To U. S. Chemical Exports

The United States chemical industry will be forced to place more emphasis on the quality of its products than on quantity and to stress newer items as increased competition in world chemical markets becomes effective. As foreign countries again are able to produce chemicals and allied products in sufficient quantities to have an exportable surplus, they will supply more and more of the demand now being met by this country, particularly for items produced on a marginal basis or for which we are now furnishing substitutes. These are the conclusions of C. C. Concannon, Chief, Chemical Branch, Office of International Trade, in an article entitled "United States Chemical Trade Maintained at a High Level" which appeared in *Foreign Commerce Weekly* for May 23.

Total U. S. foreign trade in chemicals and allied products continued at peak levels in 1948 and was valued at $1,134 million, composed of exports worth $858 million and imports worth $276 million. This total was four times as great as in 1938, due partially to higher prices, but might have been higher except for a general dollar shortage abroad, he stated.

It was pointed out that since the war, there has been a change from the balance that previously existed between imports and exports of chemicals. Exports of these products were valued at five and a half times as much in 1947 as in 1938 and declined only 3 per cent in 1948. In 1947 imports amounted to only two and a half times as much as in 1938 and then dropped 15 per cent in 1948. In terms of the purchasing power of the dollar, however, chemical imports probably have been static and in 1948 may even have dropped below the prewar rate while exports have increased about 250 per cent.

This change in the relationship of imports to exports can be traced to the war and its subsequent effects. In discussing the changed picture Mr. Concannon recalled that practically throughout the world there was an insufficiency of goods to satisfy consumption until a year ago. By the middle of 1948, however, much of the pent-up demand for chemicals and allied products as well as for other goods had been filled. Many European countries were in a position to export again and, as a result, there was a decrease in the call for United States chemicals and allied products. The chemical industry in the United Kingdom in particular again was in a position to compete to a greater extent with that of the United States in most areas and especially in those countries which did not have sufficient dollar exchange to pay for United States goods except those not obtainable elsewhere.

In the case of imports, it was stated that current decreases are partly the result of commodity unavailability in foreign countries. The inability of foreign goods to compete with domestic manufactures on an economic basis, and increases in United States output of many materials which formerly entered foreign trade on a net import basis have also affected our trade. Outstanding examples of the latter are certain fertilizers and coaltar products. Chemical imports have always consisted largely of raw materials, and these can probably be used in increasing quantities as conditions throughout the world return to normal.

Export Controls Eased

Certain types of naval stores, including tall oil, gums and resins; creosote; serums and vaccines, quinine, and soda ash are among about 500 separate items recently removed from export control by the U. S. Department of Commerce. These materials may now be shipped to any destination in the world without a validated export license. The de-controlled items have been added to the "GRO" list which permits shipment without a validated export license to any destination including the R countries (Europe and adjacent areas).

Streptomycin Production Below Expectations

Estimate of streptomycin production for 1949, made in January, will not be attained if domestic production remains under the 6-million-gram mark each month, as it has to date in reported figures, according to the Department of Commerce. February's production of 5,714,771 grams is a quarter-million grams below January's total; however, February was a short month. Quantitatively the production recession is no greater than previous drop-backs but it is the first time in the history of streptomycin that production has shown a decline in February. The present low rate of streptomycin production, which is considerably under the calculated production potential of the industry, may be due to the relatively static position of domestic consumption and exportation of streptomycin for the past 8 months. In February, producers and primary distributors reported domestic consumption as 1,123,813 grams and exports as 3,766,440 grams. Demand has not been adequate to consume production

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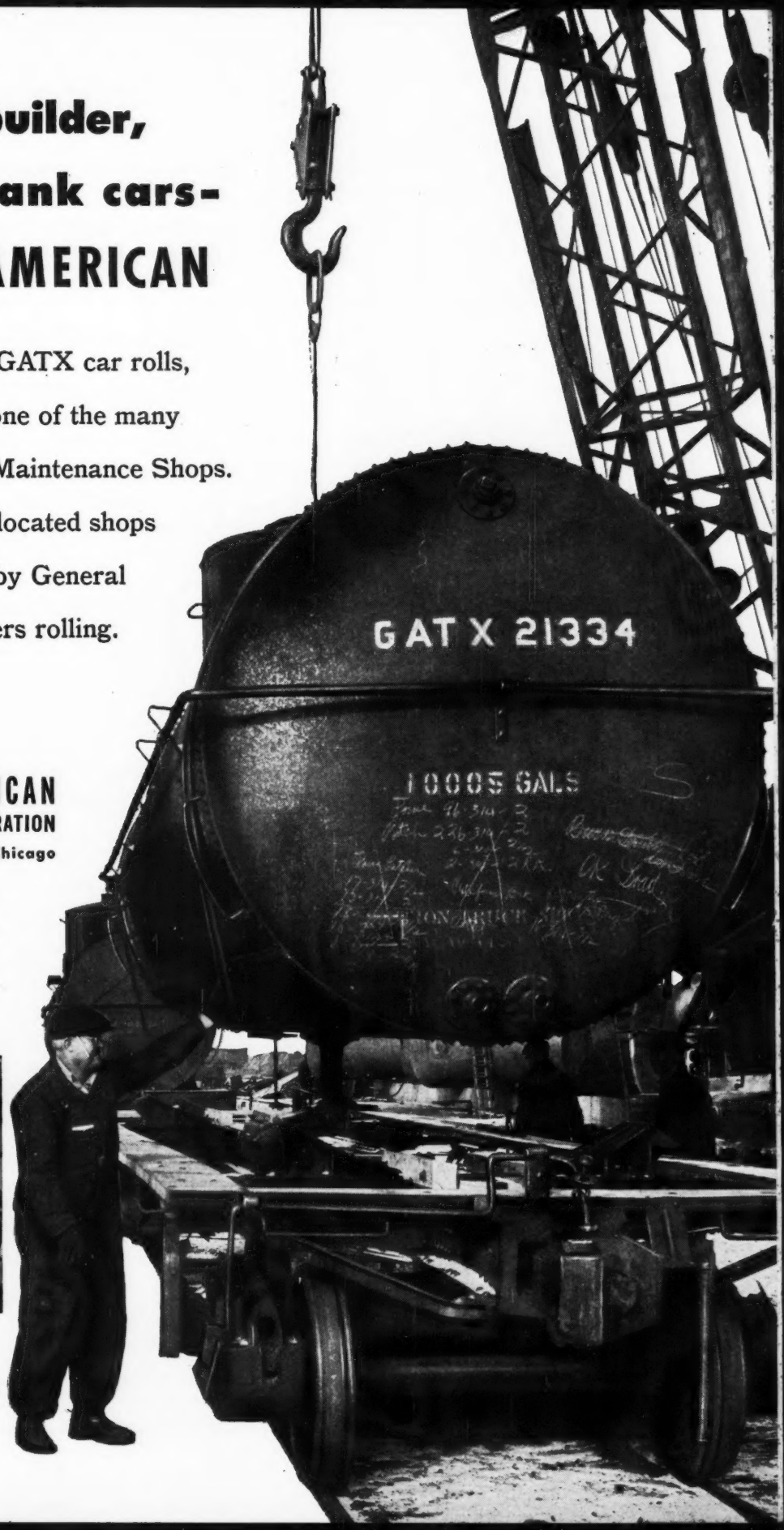

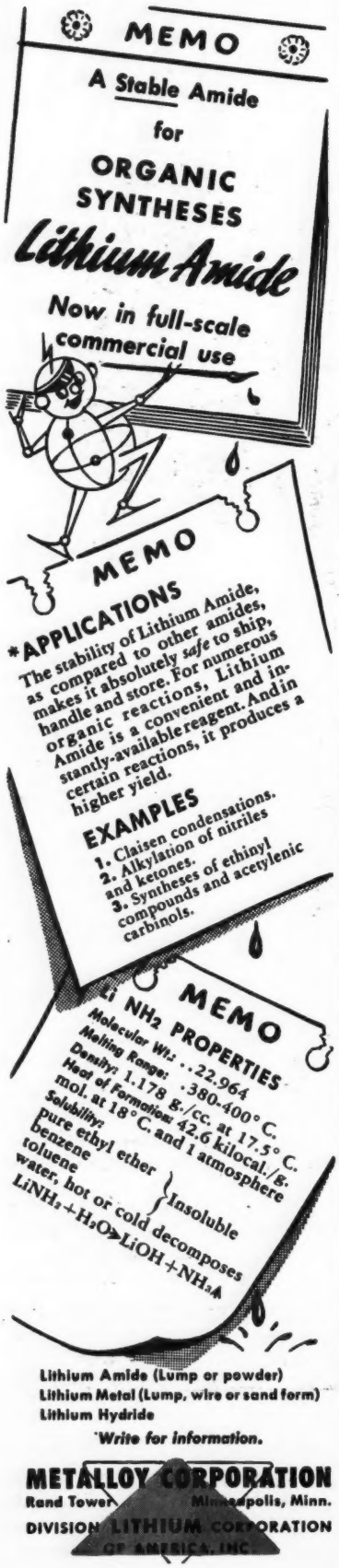
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and in consequence stocks-on-hand at the end of February totaled 7,755,101 grams, an increase of more than a million grams over the preceding month's stocks.

The 17 companies comprising the producer-primary-distributor group reported the domestic consumption of streptomycin in grams in 1948 as follows: January, 576,176; February, 604,489; March, 722,645; April, 876,528; May, 711,553; June, 981,541; July 1,032,835; August, 1,101,538; September, 1,214,903; October, 1,167,749; November, 1,118,850; and December, 1,027,214.

Development of new markets at home and abroad is imperative if the streptomycin industry is to enjoy normal expansion coupled with reasonable returns.

Soap Sales Gain

Domestic soap sales for the first quarter 1949 show an increase over fourth quarter of 1948 according to the Association of American Soap & Glycerine Producers, Inc.

Census reports to the Association from 79 manufacturers representing approximately 90% of the industry's volume show non-liquid soap sales amounting to 614,621,000 pounds. Based on only those company reports which make comparisons possible, non-liquid soap sales for the first quarter 1949 were 8% less than for the first quarter in 1948 but were 10% above the fourth quarter of 1948.

Liquid soap sold during the first quarter 1949 amounted to 1,331,000 gallons. Comparative figures indicate an increase of 1% over the first quarter of 1948 but a drop of 11% from fourth quarter 1948.

Sales of synthetic detergents in the first quarter of 1949 as reported by 27 companies total 154,871,000 pounds. In the fourth quarter of 1948, 17 companies reported a total of 120,196,000 pounds. In the first quarter of 1948, 14 companies reported 69,034,000 pounds.

A total of 88 manufacturers participated in the Association's Sales Census in the first quarter this year.

Market Review

The picture in the chemical industry was no different from that of business in general—more declines than advances in prices, lower activity in consuming industries, big stockpiles and adequate customer inventories being reduced instead of maintained. Heavy chemicals, barometer of the overall situation, were not in great demand.

Some pickup was noted in chemicals for which there is a seasonal demand. Calcium chloride for dust control on highways and dehumidification showed some life after a slow period caused by the mild winter, and lead arsenate for orchard spraying began to move. Producers of fertilizer materials were concentrating attention on booking forward contracts for the new fertilizer season starting July 1.

Coaltars were not in heavy demand, and the price of benzol remained at 20c a gallon in major consuming areas and 21c elsewhere. Phenol prices were a little shaky under conditions of ample supply. Cresol and cresylic acid were reduced 2¼c a pound and 25c a gallon respectively. A 3c reduction in coaltar toluol aroused some interest in the material at 20c a gallon (at Pittsburgh) by those who had swung to other solvents.

The change in toluol prices was indicative of the trend in solvents. Methanol, normal propyl alcohol, butyl alcohol and butyl acetate and secondary butyl alcohol and acetate all were reduced. Tankcar price for synthetic methanol was 26c a gallon after a 2c reduction. Normal propyl alcohol was down 2½c to 8c a pound delivered. A 1c reduction in both butyl alcohol and butyl acetate brought their price to 14c in tankcars, while secondary butyl alcohol and acetate were off ½c to make the tankcar price 10c and 11c respectively.

Among other organics reduced was acetaldehyde—½c a pound to 9½c a pound in tankcars. Because of the lower butyl alcohol prices, dibutyl phthalate also was reduced ½c to give a tankcar price of 30c a pound. Another plasticizer, dioctyl phthalate, had been previously cut 1½c to 2c a pound to a tankcar price of 41½c.

Price cuts of 3c a pound were registered for Rohm & Haas' synthetic non-ionic wetting agent Triton X-100 and Antara Products' Antarox "A" series non-ionic synthetic detergents.

Declines in the metals market were reflected by some further declines in metallic chemicals. Zinc and gray ammonium chloride, zinc sulphate, copper oxide and copper carbonate were among those cut. Lead pigments were also reduced—from ½c to 1c a pound—and tetraethyl lead anti-knock compounds were again lowered.

Among the few rises was the spectacular advance in the price of menthol from $9.00 a pound to $10.00-10.50. This sudden upsurge was attributed to cutting off of further supplies from China because of the war there and lower production in Brazil.

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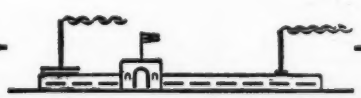

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(Continued from page 954)

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16. Bus service
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18. Motor truck service

B. Attitude of carriers
C. Highway conditions
D. Sidetrack facilities
E. In-transit privileges
F. Cost of extra trackage
G. Laws affecting transportation
H. Pipe lines
I. Demurrage charges
J. Distance from home office
K. Transportation and congestion
L. Direct and access streets
M. Nearness to trunk highways
N. Cost of wharf or dock (for waterfront site)
O. Nearness to trunk rail lines
P. Trunk line connections
Q. Interruptions

XIII. Waste Disposal

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B. Sewerage—storm and sanitary
C. Anti-noise laws
D. Drainage
E. Stream pollution laws
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H. Odor nuisance laws

XIV. Water

A. Water supply, type, ease of obtaining
B. Water, taste
C. Water supply, depth
D. Water, chemical analysis
E. Water volume available at all times
F. Water rates or cost
G. Water, bacterial analysis
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Chemical Specialties

(*Continued from page 1020*)

Repro Paper Coaters Added to Edwal Line

The Edwal Laboratories, Inc., of Chicago, engaged in research and technical service in the diazo field, is further expanding its line to coaters of reproduction papers. Its new Coupler 111, with diazo compounds 9 and 10 (compound 9, p-diazo diethylaniline zinc chloride; compound 10, p-diazo ethyl hydroxyethylaniline), forms a water-fast blue line direct positive reproduction.

Mold-Preventive Paint With Aluminum Pigment

Reynolized Aluminum Pigment, a new development of Reynolds Metals Co., Louisville, Ky., is gong into paints to protect wood and other organic surfaces against mold and rot. Using aluminum particles as a base, this new pigment contains agents integrated by a special process. When mixed with the usual vehicles designed for this type of paint, a preventive against mold and rot is provided.

Manufactured in paste form, this new aluminum pigment is similar to that found in standard aluminum paints. Generally, two pounds of the pigment mixed into a gallon of usual aluminum paint vehicle is sufficient for the most severe requirements.

The pigment makes paints which are safe. Dry coatings will not interfere with the safe storage of the food products, nor will they affect animals or poultry. They also work well on metals and other non-organic surfaces. Tests made on paper and fabrics have shown equally good results.

Floor Polish Formula

In the April 1949 issue of *The Merck Report,* the following formula for floor polish was given by Ivor Griffith in an article entitled "Formulas and Formulation for the Retail Pharmacist":

Carnauba wax No. 2	120 Gm.
Oleic acid	13.7 Gm.
Trigamine	19 Gm.
Caustic Soda (47%)	2.3 Gm.
Water	845 cc.

Melt the wax in the oleic acid, add trigamine and heat to 90°C. Then add the caustic soda and 25 cc. of water at about 95°C. Stir until a gel is formed. Then add the rest of the water which must be boiling. Stir thoroughly until cool.

Transfer Adhesive

Glyco Products Co., Inc., Brooklyn, N. Y., is offering Flexo Wax C Light as an adhesive for cellophane to hard surfaced paper. The cellophane, on which symbols, names, area characteristics, etc., are printed, is coated with a thin coating of Flexo Wax C Light by means of a roller machine. The coated printed sheets of cellophane are pressed on the hard surfaced paper and stored until needed. When needed the proper symbol is cut from the sheet, pulled off the paper and the cellophane is attached to the map, graph, plan or design background by pressure of the hand. The wax acts as the adhesive in this step also. The whole is then photographed and plates made for printing the finished sheet. The printed cellophane strips can be applied to a photo negative and by changing the symbols a number of differently designated copies of the same background can be made, showing certain changes and deviations of the same background.

Cold Rubber Tested In Rubber Footwear

New type American-made "cold rubber," now used in a limited number of passenger car tire treads, is being tested in rubber footwear by Hood Rubber Co., a division of B. F. Goodrich.

This rubber, polymerized or mixed at temperatures 80 degrees lower than those used in standard synthetics, has been found to be longer wearing and to possess greater resistance to abrasion in tire tread testing. Tests indicate it may show the same properties in relation to footwear.

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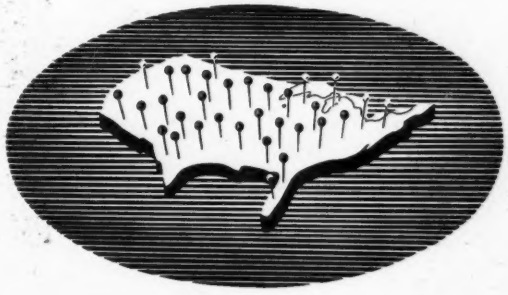

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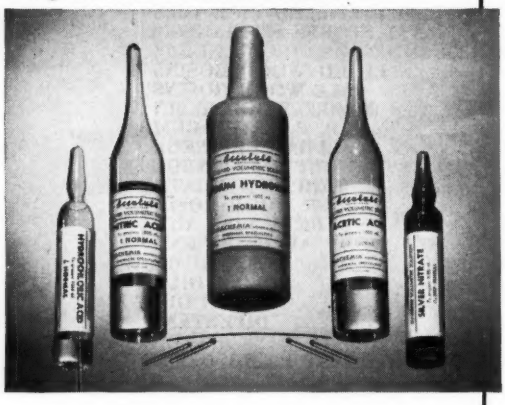

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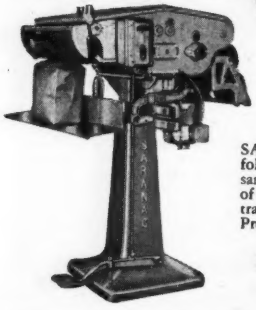

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FROM WHERE WE SIT

by "DOC"

REMEMBER OUR LITTLE story about the Army's paper napkins last month? Well, we got a telephone call the other day from the N. Y. Quartermaster Office. Seems they'd heard about those napkins from as far away as California. The fact is, the number we quoted was a thousand times too big; somebody in the Pentagon—who is now probably peeling spuds at Fort Myers—wrote "million" instead of "thousand." We sympathize: We write—lucidly, we hope—of millions and billions; but we can't imagine more than about 500.

RAILROADS have lost their spirit! The best thing they could say about the appointments of a new streamliner train, the ACF-Talgo, is that they have added "four extra inches for leg room between specially designed *airline* seats." The italics are ours.

ALWAYS SOMETHING. Jersey farmers have always thought kindly of Long Island and Westchester County stables and race-tracks, for horse manure, as all agricultural chemists know, is an excellent dressing for truck crops. But the Coast Guard won't allow the manure to be shipped across the bay, and a friend of ours who should know told us why: Manure is a fertilizer. Fertilizers (e.g., ammonium nitrate) are explosive. Therefore—and the logic is certainly straightforward—horse manure may blow up the boat!

IT IS INSTRUCTIVE, during this centennial year of the California gold rush, to read the London *Times'* reaction to it at the time:

"The finding of gold in California has been described in a leading article as the last nine days' wonder—the more remarkable because of its inaccessibility.

"It is the Far West of the whole world, for after that begins the East again. Though now included within the territory of the United States, it cannot be reached from New York within less than six months by Cape Horn, or three months by Chagres and Panama, and about the same time overland by Santa Fe. In that remote corner the banished genie reappears. If he seems to promise a greater abundance, or a more constant supply than in times past, he yet preserves his dignity by interposing 20,000 miles of ocean between himself and civilized man. The golden fleece of Colchis and the golden apples of the Atlantic Eden were not more remote or more carefully guarded . . .

"Experience . . . is against the presumption that California, be its treasures great or small, will prove a real benefit to the United States. The invariable fate of the finder of hidden treasure or the pauper heir has often come to pass with nations. Gold hunting, whether pursued by the solitary Indian or the great commercial company, is not one of those branches of ordinary and legitimate trade which train men to useful arts and steady habits, and so draw down a blessing on society even when they fail.

"It is mere gambling—an unhealthy flush of prosperity indisposing the population to regular industry, and entailing a subsequent collapse of national energy, and to some extent, of the national independence. Myriads, it is said, are now hastening from the ports of the Union, having relinquished their trades and social positions. Merchants and ship-owners are preparing to supply the adventurers.

"The enterprise promises to absorb a vast amount of industry and wealth. Whether we look to the prospects of the new colony assembled in California, or the spirit diffused over the whole Union, we see little to regret that the region is not ours."

Times change—and in changing confound the ponderous pundit who prints his little opinions for posterity to chuckle at.

A FRIEND OF OURS who likes to have fun with his slip-stick got to wondering how many a billion is—as we often do when we look at our national budget figures. He learned that Americans smoke about a billion cigarettes a day. Suppose you make all the cigarettes smoked in 6 days into one long cigarette: The Man in the Moon, some 240,000 miles away, could light it for you. Six years' of smoking would almost reach the sun, and then nobody would have to light it. We could go on—but you get out *your* slip-stick!

WE ARE TERRIFIED of the dangers of hard work after reading about the lamentable effects of same in a British chemical journal. Seems there was quite an ether fire when a workman dropped a lump of sodium into a 40-gallon copper still. After the excitement was over, the cause was investigated: "It is thought that a drop of sweat fell from the operator's face on to the sodium as it was put into the ether and the heat thereby generated ignited the vapour of the ether."

FIFTEEN YEARS AGO

(From Our Files of June, 1934)

Wool Industries Research Association report discovery of commercial method for making wool fibers unshrinkable. Simultaneously it removes the prickly feeling associated with wool.

National Labor Board hands down decision against National Aniline whose employees had struck because they had no written contract with the company. Pierre S. du Pont writes a dissenting opinion.

Harvard President James Bryant Connant, received the American Institute of Chemists' medal in recognition of his "many contributions to chemical science."

Titanium Pigment plans to erect $3,000,000 plant at Sayerville, N. J. On completion its Brooklyn laboratories will be moved there.

An Italian national dyestuff committee has been formed to study the domestic industry and propose measures for its protection and development. A central sales bureau may be formed.

Givaudan-Delawanna announces several new aromatic materials claimed to be ideal for ending "paint smell," yet to have no harmful effects on the drying or wearing qualities of the paints in which they are used.

Michigan Alkali has purchased a minority interest in Natural Soda Products, Owens Lake, California.

THIRTY YEARS AGO

(From Our Files of June, 1919)

The Utah Sulphur Corp. plans immediate construction of furnaces to cost about $180,000 for the subliming of sulphur. They are to have a capacity of 600 tons a day of sulphur ore and will produce 150 to 200 tons of sublimed sulphur every 24 hours.

The Hoffman-La Roche Co. of Basel, Switzerland, has converted the organization into a joint stock company with Rodolphe Albert Koechlin-Hoffman as president.

The National Sulphuric Acid Association has been organized in England to establish the sulphuric acid industry in the United Kingdom on a permanently prosperous basis.

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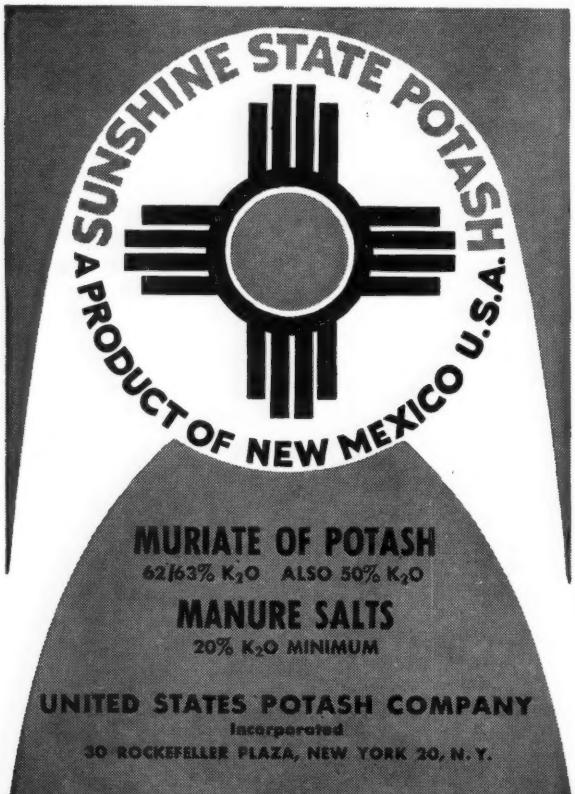

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U. S. Patents from Official Gazette—Vol. 620, Nos. 3, 4, 5 (Mar. 15-Mar. 29)
Canadian Patents Granted and Published Mar. 8-Mar. 29

*Organic

Purifying an unconjugated fatty acid nitrile by heating with maleic anhydride. No. 23,084. Anderson W. Ralston, Lowell T. Crews and Edwin W. Colt (to Armour & Co.).

Preparing disubstituted desoxyalditols by contacting a 1-R-1-desoxyglycose wherein R represents a radical selected from the group consisting of alkyl, aryl and aralkyl, and an aromatic hydrocarbon in the presence of anhydrous aluminum chloride. No. 2,460,803. William Andrew Bonner and Charles D. Hurd (to Corn Products Refining Co.).

Nuclear acylation of a furan by reacting furan with an acylating agent selected from the group consisting of acyl halides and anhydrides of carboxylic acids in the presence of an iodine catalyst. No. 2,460,822. Howard D. Hartough and Alvin I. Kosak (to Socony-Vacuum Oil Co.).

Nuclear acylation of a furan by reacting with a carboxylic acid anhydride in the presence of a strong hydroxy acid containing at least one element selected from the group consisting of sulfur, phosphorus and fluorine. No. 2,460,823. Howard D. Hartough and Alvin I. Kosak (to Socony-Vacuum Oil Co.).

Nuclear acylation of a furan by reacting with a carboxylic acid in the presence of phosphorus pentoxide. No. 2,460,824. Howard D. Hartough and Alvin I. Kosak (to Socony-Vacuum Oil Co.).

Acylating furan with acetic anhydride in the presence of a silica-alumina catalyst. No. 2,460,825. Howard D. Hartough and Alvin I. Kosak (to Socony-Vacuum Oil Co.).

Production of cylcohexane free of benzene from naphthenic gasoline. No. 2,460,852. Russell N. Shiras, Alan C. Nixon and Carl H. Deal, Jr. (to Shell Development Co.).

Manufacture of a trichloromethyl diaryl methane by condensing a chloral yielding compound with an aromatic compound in the presence of both sulfuric acid and an added quantity of the sulfonic acid of said aromatic compound. No. 2,460,865. Charles Eugene Wilson, Jr. (to E. I. du Pont de Nemours & Co., Inc.).

Sulfonating an aliphatic acid containing at least 6 carbon atoms with chlorosulfonic acid. No. 2,460,968. Léonce Bert, Michel Procofieff and Vsevolod Blinoff (to Societe Anonyme dite: Societe d'Innovations Chimiques dite: Sinnova ou Sadic).

Production of a high molecular alcohol by the reaction of a water-free alcoholic solution of an ester with metallic sodium. No. 2,460,969. Vsevolod Blinoff (to Societie Anonyme d'Innovations Chimiques dite. Sinnova ou Sadic).

Preparing a protein derivative comprising reacting a protein with an isocyanate selected from the group consisting of aromatic isocyanates and long chain aliphatic isocyanates in the presence of pyridine. No. 2,460,980. Heinz L. Fraenkel-Conrat and Harold S. Olcott (to U.S.A. by Sec. of Agriculture).

Producing 3-chloromethacrylonitrile by reacting 2,3-dichloroisobutyronitrile with liquid anhydrous ammonia. No. 2,460,996. Jerome L. Mostek (to Sinclair Refining Co.).

Refining turpentine by heating over barium oxide to remove or inactivate oxygen impurities. No. 2,461,007. Geo. H. Splittgerber (to Sinclair Refining Co.).

Recovery of ammonia in the animation of propylene by condensing the offgases separating the layer comprising ammonia. No. 2,461,010. John W. Teter and Robt. H. Stookey (to Sinclair Refining Co.).

Arylmethylmercapto aldehydes. No. 2,461,013. Wm. Howells Vinton (to E. I. du Pont de Nemours & Co.).

Producing enol acetates by condensing ketene with a ketone having at least 3 hydrogen atoms connected with the carbon atoms alpha to a keto carbon atom in the presence of a sulfonate. No. 2,461,016. Frank G. Young (to Carbide and Carbon Chemicals Corp.).

Producing enolacetates by mixing and condensing ketene with a ketone having at least 3 hydrogen atoms connected with the carbon atoms alpha to a keto carbon atom in the presence of an alkane disulfonic acid as catalyst. No. 2,461,017. Frank G. Young (to Carbide and Carbon Chemicals Corp.).

Continuous method of producing carbon monoxide and hydrogen from a solid carbonaceous material. No. 2,461,021. Harold V. Atwell (to Texas Co.).

Tertiary-aliphatic-aminoalkyl ether of a polynuclear carbinol of the group consisting of 9-xanthenol, 10-thiaxanthenol, 9-fluorenol and 9,10-dihydro-9-anthrol, and salts thereof. No. 2,461,038. John W. Cusic (to G. D. Searle & Co.).

Bis-glycolic acid amines of 2,6-diamino-pyridines. No. 2,461,119. Wm. A. Lott, Jack Bernstein and Barbara Stearns (to E. R. Squibb & Sons).

Starch ester derivatives by reaction of ungelatinized starch, water and an organic acid anhydride in an alkaline medium. No. 2,461,139. Carlyle G. Caldwell (to National Starch Products, Inc.).

Producing beta-trichlorethane by passing chlorine, hydrogen chloride and acetylene into a liquid chlorohydrocarbon. No. 2,461,142. Oliver W. Cass (to E. I. du Pont de Nemours & Co.).

Imidazolines. No. 2,461,156. Max Hartmann and Hans Isler (to Ciba Pharmaceutical Products, Inc.).

Vacuum distillation of trimethylamine from dimethylamine. No. 2,461,191. Dale F. Babcock (to E. I. du Pont de Nemours & Co.).

Separating polyhydric alcohols containing from 2-4 carbon atoms which comprises bringing the mixture into contact with a cyclic ether. No. 2,461,220. Eugene J. Lorand (to Hercules Powder Co.).

Oil miscible condensation product of an alkyl substituted aryl calcium oxide. No. 2,461,335. Louis A. Mikeska (to Standard Oil Development Co.).

Manufacture of glutaric acid. No. 2,461,336. Louis A. Mikeska (to Standard Oil Development Co.).

Unsaturated thioethers of cyclic sulfones. No. 2,461,339. Rupert C. Morris, John L. Van Winkle and Edward C. Shokal (to Shell Development Co.).

Polyalkylated cyclic sulfone halohydrins. No. 2,461,340. Rupert C. Morris and John L. Van Winkle (to Shell Development Co.).

Secondary sulfolanyl amines. No. 2,461,341. Rupert C. Morris and Alva V. Snider (to Shell Development Co.).

Preparation of a conjugated diolefin comprising contacting an aliphatic glycol with a catalyst selected from the group consisting of $AlBr_3$, $AlOBr$, $AlBr_3$, $AlOBr$, $(AlBr_3)_4.AlOBr$, $(AlBr_2Cl)_4.AlOBr$, $(Al_2Br_5Cl)_3$. $AlOBr$, $AlBr_3$-hydrocarbon complexes, BBr_3, $BBr_3.BOBr$, $TiBr_4$, $TiOBr_2$, and $TiBr_3Cl$ and distilling the conjugated diolefin from the reaction zone. No. 2,461,362. David W. Young and Chas. E. Britton (to Standard Oil Development Co.).

Production of nitriles of the general formula $R.SO_2C_6H_4.CN$ from substituted benzoic acids of the general formula $R.SO_2C_6H_4.COOH$, where R is a lower alkyl group by heating the acid with a sulphonamide. No. 2,461,437. Peter Oxley, Thos. David Robson, Adolf Koebner and Wallace Frank Short (to Boots Pure Drug Co., Ltd.).

N-acylphenothiazines. No. 2,461,460. Philip S. Winnek and Herman Eldridge Faith (to Allied Laboratories, Inc.).

Toluenesulfonates. No. 2,461,463. Alfred W. Anish (to General Aniline & Film Corp.).

Producing acrylonitrile by feeding ethylene cyanohydrin to a dehydrating zone, said zone containing an alkali forming metal salt of an organic acid as an ethylene cyanohydrin dehydration catalyst. No. 2,461,492. Erwin L. Carpenter and Harold S. Davis (to American Cyanamid Co.).

Preparation of symmetrical triaminobenzene compounds. No. 2,461,498. John Krueger (to Edwal Laboratories, Inc.).

Making a cyanoethyl ether of a gum selected from the group consisting of galactomannan and glucomannan gums, which comprises condensing said gum with an acrylonitrile. No. 2,461,502. Owen A. Moe (to General Mills, Inc.).

Manufacture of 2-amino-6-hydroxy-8-(hydroxy-methyl) pteridine. No. 2,461,503. Hans Spiegelberg and Gerald Rey-Bellet (to Hoffmann-La Roche Inc.).

Making a mono tertiary hydrocarbon amide by reacting in the presence of a mineral acid a tertiary alkyl alcohol with an amide selected from the group consisting of oxamide, acetamide and benzoic acid amide, the alkyl group of said alcohol having 4-6 carbon atoms. No. 2,461,509. Mortimer T. Harvey and Solomon Caplan (to Harvel Research Corp.).

Dehydrofluorination of polyfluoroalkanes by heating in the presence of chromium trifluoride. No. 2,461,523. Donald Drake Coffman and Richard D. Cramer (to E. I. du Pont de Nemours & Co.).

Aromatic fluorocarbon. No. 2,461,554. Waldo B. Ligett, Earl T. McBee and Vincent V. Lindgren (to Purdue Research Foundation).

Nitramines and nitroso-amines having the structural formula, $(NO_2—O—R)_3—N—N(O)_n$ wherein R is an alkylene radical and n is a whole number less than 3. No. 2,461,582. Geo. F. Wright and Walter John Chute (to Honorary Advisory Council for Scientific and Industrial Research).

Deodorization of oils. No. 2,461,694. Keator McCubbin and Chas. E. Monical (to A. E. Staley Mfg. Co.).

Conversion of an alpha amino acid selected from the group consisting of leucine, phenylalanine and glutamic acid to the corresponding alpha hydroxy acid. No. 2,461,701. Paul R. Shildneck (to A. E. Staley Mfg. Co.).

Making organic acids from carbonaceous material selected from the group consisting of coal, coke, carbon blacks and pitch by preoxidizing with an oxidizing agent which can be reoxidized by reaction with air at atmospheric pressure, dissolving in an aqueous alkaline solution, treating with oxygen gas, recovering organic acids, reoxidizing the first mentioned oxidizing agent with air and recycling. No. 2,461,740. Myron Kiebler (to Carnegie Institute of Technology).

Manufacturing phosphatides by extracting oleaginous vegetable material from a raw material with a solvent selected from the group consisting of hexane, trichloroethylene, benzene and ethanol, subjecting said extract to the action of a decolorizing agent, evaporating solvent and agitating with an aqueous medium, whereby crude phosphatides are separated. No. 2,461,750. Ralph A. Marmor and Wendell W. Moyer (to A. E. Staley Mfg. Co.).

Recovering phosphatides from oleaginous material by extracting with a solvent selected from the group consisting of hexane, trichloroethylene, benzene and ethanol, decolorizing the extract, evaporating solvent, agitating with an aqueous medium to coagulate the phosphatides and separating. No. 2,461,751. Ralph A. Marmor and Wendell W. Moyer (to A. E. Staley Mfg. Co.).

Compounds of the formula: R—CO—NH—CH_2—CH_2—CN in which R represents a lower alkyl radical. No. 2,461,842. John F. Olin (to Sharples Chemicals, Inc.).

Condensation products of tri-(beta-aminoethyl)-amine and beta-diketones or hydroxy methylene ketones. No. 2,461,894. Lyle A. Hamilton and Chas. J. Pedersen (to E. I. du Pont de Nemours & Co.).

Reacting formaldehyde and a hydrogen halide with QCX=CX'—R in

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* *U. S. Patents from Vol. 619, Nos. 2, 3, 4. Vol. 620, Nos. 1, 2. Canadian from Feb. 8 - Mar. 15.*

which Q is a member of the group consisting of hydrogen, alkyl and halogen, X and X' are members of the group consisting of hydrogen and halogen and R is a member of the group consisting of hydrogen and alkyl, in the presence of phosphoric acid and a substance taken from the group consisting of zinc chloride and aluminum chloride. No. 2,461,906. Thos. E. Londergan (to E. I. du Pont de Nemours & Co.).

Substituted guanamines, R—Vin—G in which G is a guanamine radical with a free valence on the 2 carbon atom on the triazine ring, Vin is a vinyl group, and R is an aliphatic radical connected to 1 carbon atom of the vinyl group by carbon to carbon bond, the other carbon atom of the vinyl group being connected to the 2 carbon atom of the guanamine radical by carbon to carbon bond. No. 2,461,943. Jack Theo Thurston (to American Cyanamid Co.).

2 or 4-amino quinazolines. No. 2,461,950. Frank J. Wolf (to Merck & Co., Inc.).

Catalytic hydrogenation of triisobutylene during contact with a hydrous alumina carrier having ultramicroscopic pores supporting a finely-divided platinum group noble metal selected from the class consisting of platinum and palladium. No. 2,461,959. Richard C. Brandon (to Standard Oil Development Co.).

Amino trimethyl hexamoic acids and their lactams. No. 2,462,008. Alva V. Snider and Rupert C. Morris (to Shell Development Co.).

Amino trimethyl hexanoic acids and their lactams. No. 2,462,009. Rupert C. Morris and Alva V. Snider (to Shell Development Co.).

Production of tetrahydro-3,3,5-tris-(hydroxymethyl)-5-methyl-4-pyranol by condensing formaldehyde with methyl ethyl ketone in the presence of an alkaline catalyst. No. 2,462,031. Harold Wittcoff (to General Mills, Inc.).

Preparation of a secondary nitramine of a compound of the group consisting of di-n-butylamine and morpholine by reacting the nitrate salt of one of said compounds with nitric acid and a lower fatty acid anhydride in the presence of a catalyst selected from a group consisting of hydrogen chloride and the chlorides of zinc, iron and aluminium. No. 2,462,052. Geo. F. Wright and Walter John Chute (to Honorary Advisory Council for Scientific and Industrial Research).

Synthesis of alpha tetralone from tetralin. No. 2,462,103. Robt. Johnson (to Koppers Co., Inc.).

In preparing diacetyl, the step which comprises contacting 2,3-butanediol with a dehydrogenating catalyst in the absence of oxygen. No. 2,462,107. Theodore Kritchevsky (to Ninol Development Co.).

In the manufacture of vinyl and ethylidene esters, wherein acetylene is reacted with a carboxylic acid, the improvement which comprises reacting the acetylene and the carboxylic acid in the presence of dimethyl aniline. No. 2,462,163. Frank O. Cockerille (to E. I. du Pont de Nemours & Co.).

Making alpha, alpha'-thiodialiphatic acids. No. 2,462,200. Milton P. Kleinholz (to Sinclair Refining Co.).

Preparing starch esters by contacting starch with aqueous formic acid. No. 2,462,210. Owen A. Moe (to General Mills, Inc.).

Production of acetarylamides by heating an arylamine with an excess of acetic acid. No. 2,462,221. Edgar Stagg Pemberton (to British Industrial Solvents, Ltd.).

Preparing ascorbic acid compounds by heating a 2-keto-hexonic acid compound. No. 2,462,251. Henry H. Bassford, Jr., Wm. S. Harmon and John F. Mahoney (to Merck & Co., Inc.).

Production of allyl alcohol by subjecting acrolein to the cathodic reducing action of a direct electric current in a medium comprising aqueous sulfuric acid containing ferrous sulfate and zinc acetate. No. 2,462,301. Jos. E. Bludworth, Max O. Robeson and Harry A. Truby, Jr. (to Celanese Corp. of America).

Preparing an ester of a polyhydric alcohol consisting of linked hydrocarbons having hydroxyl replacements for hydrogen atoms on different carbon atoms and an unsaturated monocarboxylic acid having conjugated ethylene bonds and one of these bonds in conjugation with the acidic carbonyl which comprises directly reacting the acid with the alcohol in the presence of a strong acidic catalyst and in an organic solvent. No. 2,462,337. Leon Shecter (to Bakelite Corp.).

1-chloro-2,2,3,3-tetrafluorocyclobutane. No. 2,462,345. Paul L. Barrick (to E. I. du Pont de Nemours & Co.).

Preparing an aromatic polyfluorocylcobutane by heating in the presence of a polymerization inhibitor an unsaturated aromatic compound containing not more than three 6-carbon atom rings and having a terminal methylene group in a side chain of not more than 4 carbon atoms and one oxygen atom with a tetrahalogenated two carbon atom polyfluoroethylene in which at least 2 of the halogens are fluorine. No. 2,462,346. Paul L. Barrick (to E. I. du Pont de Nemours & Co.).

Reaction products of polyfluoroethylenes and terminally unsaturated compounds. No. 2,462,347. Paul L. Barrick (to E. I. du Pont de Nemours & Co.).

Preparing β-lactones by reacting a ketene, $RR_1C{=}C{=}O$, with a carbonyl-containing compound selected from the group consisting of aldehydes; ketones; diketones; and ketoesters in the presence of a catalyst selected from the group consisting of alumina, and alumina-silica catalyst, an alumina-silica-zirconia catalyst, an alumina-silica-thoria catalyst, and an alumina-silica-boron oxide catalyst No. 2,562,357. John R. Caldwell and Hugh J. Hagemeyer, Jr. (to Eastman Kodak Co.).

Producing acetoacetyl amides by condensing diketene with a compound selected from the group consisting of those represented by the following general formulas: $H_2N{-}C_2H_4{-}{-}NH{-}COR_1$ and $H_2N{-}C_2H_4{-}NH{-}C_2H_4{-}NHCOR_1$ and $R_1CONH{-}C_2H_4{-}NH{-}C_2H_4{-}NHCOR_1$ wherein R_1 represents an alkyl radical containing from 8-24 carbon atoms. No. 2,462,358. John R. Caldwell (to Eastman Kodak Co.).

In the hydrofluorination of unconjugated, unsaturated aliphatic compounds, the improvement which comprises reacting hydrogen fluoride with the organic compound in the presence of fluosulfonic acid. No. 2,462,359. John D. Calfee and Francis H. Bratton (to Allied Chemical & Dye Corp.).

Preparing 1,4-dicyano-2-butene by reacting a member selected from the group consisting of the dichloro and dibromo addition products of 1,3-butadiene with an alkali metal cyanide in a liquid organic nitrile free from aliphatic unsaturation and consisting solely of nitrile nitrogen, hydrogen atoms and not more than 7 carbon atoms, said liquid organic nitrile containing dissolved therein a cuprous halide selected from the class, consisting of cuprous chloride and cuprous bromide, and isolating therefrom the resulting 1,4-dicyano-2-butene. No. 2,462,388. Glen F. Hager (to E. I. du Pont de Nemours & Co.).

Manufacture of hydrous chloretone from acetone, chloroform and water. No. 2,462,389. Geo. A. Harrington (to Socony-Vacuum Oil Co.).

Removing thiophenic contaminant from an aromatic hydrocarbon by addition of an acylating agent selected from the group consisting of acyl halides and anhydrides of carboxylic acids and a porous, adsorptive silica-zirconia catalyst. No. 2,462,391. Howard D. Hartough, Alvin I. Kosak and Ebenezer E. Reid (to Socony-Vacuum Oil Co., Inc.).

1,3-dichloro-1,2,2,3,3-pentafluoropropane. No. 2,462,402. Robt. M. Joyce, Jr. (to E. I. du Pont de Nemours & Co.).

Ammonium salts of beta-adiponitrilesulfonic acid. No. 2,462,406. Carl M. Langkammerer (to E. I. du Pont de Nemours & Co.).

3-hexenedinitrile having a methylidyne group attached through a double bond to the carbon atom in the 2-position and another methylidyne group attached through a double bond to the carbon atom in the 5-position, the remaining valence of each of said methylidyne groups being attached to separate carbon atoms which have a carbon-to-carbon double bond conjugated with that of the methylidyne group. No. 2,462,407. Carl M. Langkammerer (to E. I. du Pont de Nemours & Co.).

Formaldehyde by catalytic oxidation of methanol. No. 2,462,413. Wm. B. Meath (to Allied Chemical & Dye Corp.).

Hydrocarbon oil containing a small proportion sufficient to stabilize said oil against deterioration from oxidation, of the reaction product obtained by reacting polyalkylaralkyl halides with a phenol. No. 2,462,426. Orland M. Reiff and Howard D. Hartough (to Socony-Vacuum Oil Co., Inc.).

Preparing organic thiocyanates and isothiocyanates by reacting an organic halide selected from the class consisting of organic chlorides, bromides and iodides, an alkali metal cyanide and an excess of sulfur. No. 2,462,433. Norman E. Searle (to E. I. du Pont de Nemours & Co.).

Maleic anhydride from maleic acid. No. 2,462,444. John M. Weiss.

Preparation of an oxo-carbonyl compound by reacting an olefinic unsaturated compound under pressure with a mixture of carbon monoxide and hydrogen in the presence of a metal from group II of the periodic table of elements having an atomic number from 12-30. No. 2,462,448. Gerald M. Whitman (to E. I. du Pont de Nemours & Co.).

Separation of essential polyamino from monoamino acids by passing an aqueous solution of the essential acids over water-insoluble phenol formaldehyde sulfonic acid resin serving as a cation exchanger. No. 2,462,597. Richard J. Block (to C. M. Armstrong, Inc.).

Preparing di-(2-ethylhexyl) tetrachlorophthalate by heating a mixture of 2-ethylhexanol, a chlorinated compound selected from the class consisting of tetrachlorophthalic acid and tetrachlorophthalic anhydride, and an esterification catalyst. No. 2,462,601. Geo. J. Bohrer (to General Electric Co.).

Preparing a mixed vinyl lower-alkyl ether by admixing the corresponding 1-chloroethyl lower-alkyl ether with pyridine and heating. No. 2,462,602. Donald G. Botteron (to Pittsburgh Plate Glass Co.).

Trifluoromethylhexachlorocyclohexane. No. 2,462,654. Earl T. McBee and Lavon D. Bechtol (to Purdue Research Foundation).

Preparing thiophene-2-carboxylic acid and thiophene-2-carboxylic acid chloride by condensing thiophene with acetic anhydride in an organic solvent of the class consisting of nitrobenzene and chlorinated benzenes and in the presence of anhydrous aluminum chloride to form 2-acetothienone, and oxidizing the 2-aceto-thienone while dissolved in the organic solvent with an aqueous alkaline solution of sodium hypochlorite. No. 2,462,697. Viktor Weinmayr (to E. I. du Pont de Nemours & Co.).

Preparation of dl-menthone by heating a material selected from the group consisting of menthols and menthones with a catalyst selected from the group consisting of Raney nickel and copper chromite and in the presence of an alkali metal base. No. 2,462,712. Arthur L. Barney (to Purdue Research Foundation).

Preparation of an N-N^1 dimethylethanolamine by subjecting formaldehyde cyanhydrin to hydrogenation in the presence of formaldehyde and methanol. No. 2,462,736. Wm. F. Gresham (to E. I. du Pont de Nemours & Co.).

Synthesis of organic oxygen-containing compounds from a reaction mixture comprising a saturated aliphatic monohydric alcohol containing not more than 3 carbon atoms per molecule, carbon monoxide and a diffused cobalt acetate catalyst. No. 2,462,738. Wm. F. Gresham (to E. I. du Pont de Nemours & Co.).

Preparing 11-amino-undecyclic acid from 11-bromo-undecylic acid and ammonia. No. 2,462,855. Michailas Genas (to Compagnie de produits chimiques et electrometallurgiques Alais).

Catalytic vapor phase oxidation of crotonaldehyde to maleic acid and maleic anhydride. No. 2,462,938. Jos. E. Bludworth and Paul C. Pearson, Jr. (to Celanese Corp. of America).

Separation of the components of a member of the class consisting of a mixture of the isomeric 7- and 5-chloro-4-hydroxy-3-methyl quinoline-2-carboxylic acids and a mixture of esters of these two acids by treating with an acid selected from the class consisting of formic acid, hydrochloric acid and sulfuric acid to dissolve the 5-chloro isomer only. No. 2,462,939. Maurice Ernest Bouvier and Michel Mauris Mosnier (to Societe des Usines Chimiques Rhone-Poulenc).

Manufacture of a derivative of a para-aminobenzenesulphonamide by treating 2-(para-aminobenzenesulphonamido)-thiazole with sodium glyoxylate in a solvent medium. No. 2,462,963. Max Hartmann and Jean Druey (to Ciba Pharmaceutical Products, Inc.).

Producing itaconic acid by fermenting a carbohydrate-containing nutrient medium with molds of the genus Aspergillus. No. 2,462,981. Lewis B. Lockwood and Andrew J. Moyer (to U.S.A. by Sec. of Agriculture).

Production of furfural by treating fermented sulfite liquor. No. 2,463,000. Johan Waldemar Sevón.

Treating animal and vegetable oils to free the same from metallic impurities by agitating with an alkali metal salt of ethylene diamine tetra-acetic acid. No. 2,463,015. Frederick C. Bersworth.

Removing the water of solution from an aqueous solution of polymeric glyoxal hydrates by adding p-dioxano(b)-p-dioxane. No. 2,463,030. Howard R. Guest and Raymond W. McNamee (to Carbide and Carbon Chemicals Corp.).

Separating cycloolefins from open-chain olefins by contacting with an aqueous solution of ethylene glycol monomethyl ether containing water. No. 2,463,036. Geo. L. Hervert and Maurice J. Murray (to Universal Oil Products Co.).

Forming chlorine-containing formals by reacting formaldehyde hydrogen chloride and acetylene. No. 2,463,227. Jos. Frederic Walker (to E. I. du Pont de Nemours & Co.).

Sulfonating a benzimidazole. No. 2,463,264. Chas. Graenacher and Franz Ackermann (to Ciba Ltd.).

In recovery of rosin acids adding to the mother liquor sulphuric acid diluted with anhydrous alkyl alcohols organic solvent to neutralize the alkalinity of the mother liquor, heating to esterify residual fatty acids with the anhydrous alcohol organic solvent and to isomerize rosin acids to crystallizable forms. No. 2,463,274. Alfred G. Houpt (to American Cyanamid Co.).

Manufacturing nitriles having at least 2 carbon atoms by reacting a cycloolefinic hydrocarbon selected from the group consisting of methyl cyclohexenes, dimethyl cyclohexenes, trimethyl cyclohexenes, and methyl tetralin, with ammonia in the presence of molybdenum oxide. No. 2,463,456. Wm. I. Denton and Richard B. Bishop (to Socony-Vacuum Oil Co.).

Production of nitriles having at least 2 carbon atoms by reacting a cycloolefinic hydrocarbon selected from the group consisting of methyl cyclohexenes, dimethyl cyclohexenes, trimethyl cyclohexenes, and methyl tetralin with ammonia in the presence of vanadium oxide. No. 2,463,457. Wm. I. Denton and Richard B. Bishop (to Socony-Vacuum Oil Co.).

Lower alkylolamide of gentisic acid. No. 2,463,462. John L. Huck, Jr. (to Hoffmann-La Roche, Inc.).

Manufacturing nitriles having at least 2 carbon atoms by contacting a cycloolefinic hydrocarbon selected from the group consisting of methyl cyclohexenes, dimethyl cyclohexenes and trimethyl cyclohexenes with ammonia (in vapor phase) in the presence of catalytic oxides obtained by treating a heteropoly compound containing an acid anhydride molecule selected from the group consisting of MoO_3, WO_3, and V_2O_5. No. 2,463,466. Milton M. Marisic, Wm. I. Denton and Richard B. Bishop (to Socony-Vacuum Oil Co.).

Halogen-substituted alkyl guanamines. No. 2,463,471. Jack Theo Thurston (to American Cyanamid Co.).

Preparing thiophenealdehydes and thiophene carboxylic acids by reacting a beta, beta thenylhydroxylamine with an oxidizing agent in alkaline solution. No. 2,463,500. Howard D. Hartough (to Socony-Vacuum Oil Co.).

Halophenyl acetals. No. 2,463,541. Alva L. Houk (to Rohm & Haas Co.).

Preparing polycyclopentadiene by dissolving cyclopentadiene in a 2-haloalkene-1 from the class consisting of 2-chloropropene, 2-chloro-butene-1, 2-chloropentene-1, 2-bromopropene, 2-bromopentene-1, and 2-iodopropene and polymerizing the dissolved cyclopentadiene with a catalyst selected from the class consisting of tin tetrachloride, aluminum bromide, aluminum chloride, boron chloride and boron fluoride. No. 2,463,596. Geo. B. Butler (to Rohm & Haas Co.).

Removing the colored substances from colored alkyl ester of acrylic acid obtained from the pyrolysis of alkyl alpha-acetoxy propinonate by washing with a reagent consisting of an aqueous solution of an hydroxide taken from the group consisting of alkali metal and alkaline earth metal hydroxides. No. 2,463,608. Martin L. Fein and Chas. H. Fisher (to U.S.A. by Sec. of Agriculture).

Separating a mixture of acetonitrile and trichloracetonitrile by distilling with paraffinic hydrocarbon. No. 2,463,629. Andrew Karr (to American Cyanamid Co.).

Nicotinum salts and their production. No. 2,463,666. Chas. F. Woodward and Leopold Weil (to U.S.A. by Sec. of Agriculture).

Removing reducing sugar from an aqueous polyhydric alcohol solution by heating under non-hydrogenating conditions with a basic substance, passing the reacted mixture through a cation exchanger operating in the hydrogen cycle and through an anion exchanger. No. 2,463,677. John D. Brandner (to Atlas Powder Co.).

Racemization of d-α hydroxy β,β dimethyl γ butyrolactone by treating with an alkali metal alcoholate of a monohydric acylic alcohol having 1-4 carbon atoms. No. 2,463,734. Chas. O. Beckmann (to Nopco Chemical Co.).

Production of ketones by reacting an unsaturated hydrocarbon with an organic acid derivative selected from the class consisting of organic acid anhydrides and ketenes in the presence of a catalyst selected from the class consisting of hydrogen fluoride and boron fluoride. No. 2,463,742. Alva C. Byrns (to Union Oil Co. of Calif.).

Production of gamma-butyrolactone by reacting a saturated furan compound selected from the group consisting of tetrahydrofuran, 2-methyl tetrahydrofuran and 2-ethyl tetrahydrofuran with nitrogen tetroxide. No. 2,463,776. David Gwyn Jones and Fred Dean (to Imperial Chemical Industries Ltd.).

Reacting glutamic acid, an aliphatic acyl halide containing from 8-20 carbon atoms, and a base selected from the group consisting of potassium hydroxide, magnesium oxide, magnesium hydroxide, and mixtures thereof, in aqueous solution to produce an N-acyl glutamate, reacting the glutamate with a mineral acid to produce N-acyl glutamic acid and neutralizing with sodium hydroxide. No. 2,463,779. Ernest B. Kester (to U. S. A. by Sec. of Agriculture).

Production of, para-acetylaminobenzenesulphonylguanidines by heating a member of the class consisting of the ammonium and amine salts of para-acetylaminobenzenesulphonylcyanamides. No. 2,463,793. Michel Marius Mosnier (to Societe des Usines Chimiques Rhone-Poulenc).

Benzanthronylamino dianthrimide acridones. No. 2,463,810. Mario Scalera and Asa W. Joyce (to American Cyanamid Co.).

Acylguanylthioureas. No. 2,463,819. Russell L. Sperry (to American Cyanamid Co.).

Amino alkyl benzoates No. 2,463,831. Glenn E. Ullyot (to Smith, Kline & French Laboratories).

Production of chlorohydrins from liquid olefin hydrocarbons by admixing the liquid olefin hydrocarbon, water and carbon dioxide to form an aqueous emulsion, adding an aqueous solution of alkali hypochlorite. No. 2,463,850. Benjamin T. Brooks (to Standard Oil Development Co.).

Preparation of a melaminyl-phenyl-stibonic acid compound by reacting 2-chloro-4,6-diamino-1,3,5-triazine with an aminophenyl stibonic acid in the presence of oxalic acid. No. 2,463,861. Ernst A. H. Friedheim.

Allyl ethers of starch. No. 2,463,869. Robt. M. Hamilton and Elias Yanovsky (to U.S.A. by Sec. of Agriculture).

Separating pentene-1 from its mixtures with other Cs olefins by contacting an olefinic mixture with sulfuric acid. No. 2,463,873. Raymond L. Heinrich (to Standard Oil Development Co.).

Production of glutamic acid and salts thereof. No. 2,463,877. Forest A. Hoglan (to International Minerals and Chemical Corp.).

N-methyl-l-glucosamine and acid salts thereof. No. 2,463,885. Frederick A. Kuehl, Jr., Edwin H. Flynn and Karl Folkers (to Merck & Co., Inc.).

Methyl ester of N-phenylacetylisoleucine. No. 2,463,939. Otto K. Behrens (to Eli Lilly & Co.).

N-(2-phenylacetoxyethyl)-phenylacetamide. No. 2,463,940. Otto K. Behrens, Reuben G. Jones and Jos. W. Corse (to Eli Lilly & Co.).

Compound selected from the group consisting of the dl- and l-isomers of N-phenylacetylvaline, N-phenylacetylisoleucine, N-phenylacetyl-α-amino-n-butyric acid, N-phenylacetyl-β,β-diethylalanine, N-phenylacetyl-nor-valine, and their water-soluble metal salts. No. 2,463,941. Otto K. Behrens (to Eli Lilly & Co.).

Member of the group consisting of N-(2-hydroxyethyl)-phenylacetamide, N-(2-hydroxypropyl)-phenylacetamide and N-(2-hydroxybutyl)-phenylacetamide, and the lower alkyl ethers. No. 2,463,942. Otto K. Behrens, Reuben G. Jones and Jos. W. Corse (to Eli Lilly & Co.).

Alkyl parabanate. No. 2,463,986. Kermit D. Longley (to Quaker Chemical Products Corp.).

Preparing a carboxyacylated di-(β-carboxyethyl)-amine ester by heating a tri-(β-carboxyethyl)-amine ester, an inert solvent and a carboxy-acylating agent of the class consisting of carboxylic acid anhydrides, carboxyacyl chlorides and carboxyacyl bromides. No. 2,463,989. Samuel M. McElvain and Gilbert J. Stork.

Isothioureides of aliphatic sulfides. No. 2,463,998. Ewald Rohrmann (to Eli Lilly & Co.).

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Quinoline compound stable against hydrolysis by reacting quinoline with an inorganic acid of the group consisting of sulphuric, nitric and phosphoric acids, and then reacting the salt obtained thereby with hydroxylamine. No. 2,464,004. Paul W. Stokesberry (to Julep Co.).

Preparation of dialkyl-substituted dihalogenosilanes by reaction between a lower alkyl monohalide and the silicon a catalyst selected from the class consisting of copper, halides of copper, oxides of copper, and mixtures thereof and a promoter for the catalyst selected from the class consisting of zinc, halides of zinc, and mixtures thereof. No. 2,463,033. Wm. F. Gilliam (to General Electric Co.)).

Manufacturing meta-phenylene diamine by hydrogenating an dehalogenating 2,4- and 2,6-dinitrochlorobenzene by dissolving in a lower aliphatic alcohol, suspending Raney nickel in the solution and hydrogenating. No. 2,464,044. Jonas Kamlet (to Boyle-Midway, Inc.).

Preparing mercaptans by reacting an olefin with hydrogen sulfide in the presence of a stannic halide. No. 2,464,049. Louis A. Mikeska (to Standard Oil Development Co.).

Amidation of esters. No. 2,464,094. Edwin Marshall Meade (to Lankro Chemicals, Ltd.).

Esters of 2,3-epoxypropylmalonic acid. No. 2,464,137. Harold Levy and Ralph Daniels (to William R. Warner & Co., Inc.).

Esters of 1-methyl-3-acyloxypropyl-alpha halomalonic acids. No. 2,464,158. Otto Schwarzkopf and Arnold D. Lewis (to William R. Warner & Co., Inc.).

Recovery of pentaerythritol. No. 2,464,167. Jos. A. Wyler (to Trojan Powder Co.).

Derivatives of 9-anilinoacridine. No. 2,464,171. Edgar C. Britton and Gerald H. Coleman (to Dow Chemical Co.).

Esters of 5-tertiarybutylsalicyclic acid. No. 2,464,172. Edgar C. Britton and Ezra Monroe (to Dow Chemical Co.).

N-aralkyl-alkylamine salts of chlorophenols. No. 2,464,176. Gerald H. Coleman (to Dow Chemical Co.).

Method of selectively reducing the nitro group in 2 position of 2,4-dinitro phenols. No. 2,464,194. Bernhard G. Zimmerman (to General Aniline & Film Corp.).

Canadian

Dehydrogenating cyclohexanol to produce cyclohexanone by passing cyclohexanol in the vapor phase mixed with hydrogen over nickel catalyst. No. 454,462. Augustus S. Houghton and Homer E. McNutt (to Allied Chemical & Dye Corp.).

Preparing a relatively stable organo-aquasol by adding an aqueous solution of a water-soluble sodium salt of methyl siliconic acid to a solution of an acid. No. 454,471. John R. Elliott and Robert H. Krieble (to Canadian General Electric Co., Ltd.).

Making piperazino-piperazines by reacting a glyoxal with an ethylene diamine. No. 454,475. Henry C. Chitwood and Raymond W. McNamee (to Carbide & Carbon Chemicals, Ltd.).

Making 2-methyl piperazine by subjecting dimethyl piperazino-piperazine to hydrogenolysis in the liquid phase in the presence of a finely divided nickel catalyst. No. 454,476. Henry C. Chitwood (to Carbide & Carbon Chemicals, Ltd.).

Separation of butadiene from butylenes by contacting with a liquid selective solvent for the butadiene which consists of acetone and water. No. 454,527. Rupert C. Morris and Theodore W. Evans (to Shell Development Co.).

Producing acetylene from a methane-rich hydrocarbon and oxygen. No. 454,528. Jan. D. Ruys and Leonard Stone—also known as Leonard Goldstein (to Shell Development Co.).

Production of unsaturated ketones by contacting acetone vapors with calcium aluminate. No. 454,529. William A. Bailey, Jr., and Walter H. Peterson (to Shell Development Co.).

Azeotropic distillation of a mixture of isoprene and mono-olefins in the presence of methyl formate. No. 454,530. Theodore W. Evans, Edward C. Shokal and Rupert C. Morris (to Shell Development Co.).

Preparing anhydrous acetone by passing aqueous acetone into a fractionating zone, introducing ethylene glycol into the upper part of said fractionating zone and separating a vapor fraction containing the water-free acetone. No. 454,531. Gino J. Pierotti and Clarence L. Dunn (to Shell Development Co.).

Manufacturing of trans-1,2-dichlorethylene by conducting acetylene through a hydrochloric solution of chloride of copper in the presence of mercuric chloride. No. 454,534. Erich Adler (to Stockholms Superfosfat Fabricks Aktiebolag).

Separation of sodium phenolate from sodium sulphite from fusing sodium benzene sulphonate with caustic soda with a saturated monohydric aliphatic alcohol solvent. No. 454,586. Albert Thomas Fellows (to The Barrett Co.).

4-N-Phenyl-6-N-myristoyl-myristoguanamine. No. 454,588. Hans Z. Lecher (to American Cyanamid Co.).

Preparing a halogen-substituted guanamine from a biguanide and an ester of a halogen-substituted carboxylic acid. No. 454,589. Jack T. Thurston (to American Cyanamid Co.).

Napthenoguanamine. No. 454,590. Jack Theo Thurston (to American Cyanamid Co.).

Preparing diguanamines by admixing a biguanide and a diester of an aliphatic dicarboxylic acid. No. 454,591. Jack T. Thurston (to American Cyanamid Co.).

Preparing an unsubstituted aliphatic polyene guanamine by dissolving a biguanide in a solvent adding a lower alkyl ester of a polyolefinic aliphatic carboxylic acid. No. 454,592. Jack T. Thurston (to American Cyanamid Co.).

A γ-dialkylaminopropyl β, β-diphenylproplonate, the alkyl groups being identical straight-chain containing from 2 to 4 carbon atoms. No. 454,593. Roger B. Holmes and Arthur J. Hill (to American Cyanamid Co.).

Dialkylaminoalkyl ester of o-ethomethyl benzoic acid and its salts. No. 454,594. Robert P. Parker, Arthur J. Hill (to American Cyanamid Co.).

Ester of p-alkylaminoalkoxymethyl benzoic acid and its salts. No. 454,595. Victor S. Salvin, Arthur J. Hill (to American Cyanamid Co.).

Preparing an alkamine ester of an N substituted p-aminomethyl benzoic acid by reacting the corresponding N substituted p-aminomethyl benzoyl halide with a dialkylamino alcohol. No. 454,596. Robert P. Parker, Arthur J. Hill (to American Cyanamid Co.).

Production of glutaric acid by adding deltahydroxyvaleric aldehyde to nitric acid and sodium nitrite. No. 454,649. John George Mackay Bremner, Robert Holroyd Stanley, David Gwyn Jones and Arthur William Charles Taylor (to Imperial Chemical Industries, Ltd.).

Production of an antineuritic compound by condensation of a hydrobromide of 2-methyl-6-amino-pyrimethyl bromide with 4-methyl-5-(beta-hycroxyethyl) thiazole in the presence of butanol. No. 454,665. Robert R. Williams and Joseph K. Cline (to Research Corp.).

2-methyl-6-iodo-pyrimethyl-ethyl ether. No. 454,666. Robert R. Williams and Joseph K. Cline (to Research Corp.).

2-methyl-6-amino-pyrimethyl-ethyl ether. No. 454,667. Robert R. Williams and Joseph K. Cline (to Research Corp.).

Process for the catalytic dehydrogenation of isobutane by passing vapors of isobutane to be dehydrogenated under dehydrogenation conditions at a continuously decreasing temperature. No. 454,668. Robert M. Roberts and James Burgin (to Shell Development Co.).

Producing acrolein by subjecting diallyl ether to thermal non-catalytic pyrolysis. No. 454,669. Willard B. Converse (to Shell Development Co.).

Resolving a mixture of tetrachlorosilane and trimethylchlorosilane by fractional distillation in the presence of a nitrile selected from the group consisting of acetonitrile and acrylonitrile. No. 454,723. Robert O. Sauer and Charles E. Reed (to Canadian General Electric Co., Ltd.).

N-substituted aminoalkylidene succinic acid derivative. No. 454,744. Franz Bergel and Aaron Cohen (to Roche Products, Ltd.).

Separation of butadiene from butylenes by contacting a gaseous mixture with liquid acetic anhydride to selectively dissolve the butadiene. No. 454,745. Theodore W. Evans and Rupert C. Morris (to Shell Development Co.).

Manufacture of phenol by vapour phase oxidation of benzene. No. 454,782. Frank Porter (to Allied Chemical and Dye Corp.).

In manufacture of synthetic phenol involving sulphonation of benzene, conversion of the benzene sulphonic acid to sodium benzene sulphonate, fusion of the sulphonate with sodium hydroxide, separation of the sodium phenolate and recovery of phenol therefrom, the improvements which comprise contacting the fusion mass with saturated sodium sulphite solution obtained from a previous operation. No. 454,783. John M. Harris, Jr., Norman W. Wroby and William B. Brown (to Allied Chemical and Dye Corp.).

Cyclohexyl alpha-hydroxyisobutyrate. No. 454,789. Coleman R. Caryl, Jack T. Thurston and Donald W. Kaiser (to American Cyanamid Co.).

Preparing dithiobiuret by reacting dicyandiamide with hydrogen sulphite in the presence of an inert solvent. No. 454,790. Russell L. Sperry (to American Cyanamid Co.).

Preparing benzoyl biuret by heating benzoylguanylurea with water. No. 454,791. Pierrepont Adams (to American Cyanamid Co.).

Preparing monothiobiuret by heating guanyl urea or guanyl urea carbonate, and hydrogen sulphide. No. 454,792. Russell L. Sperry (to American Cyanamid Co.).

Preparing dithioammelide and alkaline salts thereof by heating a solution containing an alkaline salt of ω-cyanoguanidodithiocarbonic acid. No. 454,793. Donald W. Kaiser (to American Cyanamid Co.).

Preparing guanidine salts by adding an aqueous solution containing cyanamide to an aqueous solution of ammonia and an ammonium salt. No. 454,794. Joseph H. Paden and Alexander F. MacLean (to American Cyanamid Co.).

Preparing mono-octadecyl guanadine hydrochloride by adding an aqueous solution containing cyanamide to an aqueous solution of mono-octadecylamine hydrochloride and mono-octadecyl amine. No. 454,795. Joseph H. Paden and Alexander F. MacLean (to American Cyanamid Co.).

ω-bromo-4-phenacyl-5,6-benzopyridine. No. 454,797. James M. Smith, Jr. (to American Cyanamid Co.).

Preparing an alkali metal salt of dicyanimide by reacting in water a dicyanimide salt of a metal chosen from the group consisting of calcium, copper, and zinc with an alkali metal salt. No. 454,798. Daniel E. Nagy and Bryan C. Redmon (to American Cyanamid Co.).

Preparing barium dicyanimide by reacting a dicyanimide salt of a metal chosen from the group consisting of calcium, copper, and zinc with barium hydroxide. No. 454,799. Daniel E. Nagy and Bryan C. Redmon (to American Cyanamid Co.).

Producing an unsaturated carboxylic acid by reacting ketene and a ketone having directly attached to the carbon atom of the carbonyl group at least one radical selected from the class consisting of alkyl, cycloalkyl and aralkyl radicals, in the presence of an acidic condensing agent selected from the group consisting of the volatile halides of trivalent metals and acidic boron compounds. No. 454,831. Albert B. Boese, Jr. (to Carbide and Carbon Chemicals, Ltd.).

1-methyl-3-dimethyl-cyclohexanyl-(5) salicylate. No. 454,845. Frits Edward Stockelbach (to Fries Bros., Inc.).

Recovering pyridine bases from saturator-bath liquor of ammonium sulphate. No. 454,860. Bernard Jacob Cornelis van der Hoeven (to Koppers Co., Inc.).

Carbalkoxylating an organic compound of the type $X \cdot CH_2 \cdot CO_2R$, where X is an alkene radical and R is an alkyl radical by mixing with an anhydrous alkali metal alcoholate and a large excess of a dialkyl carbonate whereby one of the hydrogens of the CH_2 group is replaced by a carbalkoxyl group and the other hydrogen is replaced by an alkali metal. No. 454,865. Vernon H. Wallingford and August H. Homeyer (to Mallinckrodt Chemical Works).

Production of physiologically active derivatives of pyridoxine by reacting with ammonia a compound selected from the group consisting of pyridoxine and the esters thereof. No. 454,881. Esmond E. Snell (to Research Corp.).

Purifying secondary butyl alcohol containing as impurities water and secondary butyl ether by forming a ternary azeotrope with the alcohol and ether, condensing and decanting it into an aqueous and a non-aqueous layer, and returning a portion of the non-aqueous layer to the top of the column as reflux. No. 454,886. John A. Patterson and Rudolph J. Ozol (to Standard Oil Development Co.).

Preparing lead nitroaminoguanidine by reacting nitroaminoguanidine with lead hydroxide. No. 455,141. LeRoy V. Clark (to American Cyanamid and Chemical Corp.).

Manufacture of guanidine nitrate by heating a member of the group consisting of cyanamide and dicyandiamide in liquid ammonia in the presence of a nitrate. No. 455,142. William Hermann Hill, Robert Cuthbertson Swain and Joseph Hayes Paden (to American Cyanamid Co.).

Condensation product of amidine with alkylene oxide. No. 455,144. Walter P. Ericks (to American Cyanamid Co.).

Symmetrical disubstituted alkylol guanamine. No. 455,145. Walter P. Ericks and James H. Williams (to American Cyanamid Co.).

Nitroguanidine. No. 455,146. Kenneth D. Ashley (to American Cyanamid Co.).

Carboxylic acid ester of s-alkylol isothiourea. No. 455,147. David W. Jayne, Jr., and Harold M. Day (to American Cyanamid Co.).

Making dicarbonylic compounds by catalytically oxidizing one of the group consisting of alkylene glycols and polyalkylene glycols, with molecular oxygen in the presence of a repressant comprising a hydrogen halide. No. 455,166. Raymond W. McNamee and Jesse T. Dunn (to Carbide and Carbon Chemicals, Ltd.).

Diguanamine. No. 455,200. John Kenson Simons (to Libbey-Owens-Ford Glass Co.).

Production of cyclohexane from a hydrocarbon mixture comprising open chain hexanes and methylcyclopentane by subjecting said hydrocarbon mixture and a hydrocarbon-aluminum chloride complex to continuous countercurrent contact in the presence of added hydrogen chloride. No. 455,220. William E. Ross and Philip Pezzaglia (to Shell Development Co.).

*Packaging

Moistureproof, heat-sealable sheet wrapping material comprising a non-fibrous base film of regenerated cellulose provided with a continuous sub-coating comprising a resinous aliphatic ether derivative of a methylol melamine. No. 2,462,185. Paul Matthew Hauser (to E. I. du Pont de Nemours & Co.).

*Paper and Pulp

Canadian

In producing flame-resistant paper, furnishing to the beater a cellulosic fibre, a metal compound selected from the group comprising the oxides and sulfides of arsenic, antimony, tin, bismuth, and a halogenated organic material. No. 454,507. Danile DeWitt Cameron (to Hercules Powder Co.).

Emulsion coating for paper consisting of a continuous phase of a rupturable solid methyl-cellulose containing discrete oily marking liquid inclusions of low polarity. No. 454,513. Barrett K. Green (to National Cash Register Co.).

Water absorbent paper coated with a coating consisting of a water soluble binder and calcium carbonate and tartaric acid held by the binder whereby the coating may be destroyed by dipping in water. No. 455,135. Chauncy Pease Foote, Jr. and Clifford Daniel Guertin (to American Bank Note Co.).

*Petroleum

Manufacturing motor fuel from a mixture of carbon monoxide and hydrogen. No. 2,461,064. Lebbeus C. Kemp, Jr. (to Texas Co.).

Manufacturing motor fuel by catalytic conversion of a mixture of carbon monoxide and hydrogen. No. 2,461,065. Lebbeus C. Kemp, Jr. (to Texas Co.).

Simultaneous catalytic cracking and desulfurization of hydrocarbons by contacting vapors at catalytic cracking conditions with a 3-component dried synthetic gel type catalyst consisting of silica, alumina and ferric oxide. No. 2,461,069. Milton M. Marisic, Arthur C. Schmitt and Frederick C. Frank (to Socony-Vacuum Oil Co.).

Dehydrogenation of a hydrocarbon in the presence of added steam by contacting with an alkali-promoted iron oxide containing catalyst. No. 2,461,147. Elwyn P. Davies and Frank T. Eggertsen (to Shell Development Co.).

Manufacture of high antiknock gasoline from carbon oxides and hydrogen in the presence of a synthesis catalyst. No. 2,461,153. Arthur R. Goldsby (to Texaco Development Corp.).

Pyrolytic conversion of hydrocarbons. No. 2,461,172. Harry Louis Pelzer (to Sinclair Refining Co.).

Dehydrogenation of hydrocarbons in the presence of a gaseous diluent. No. 2,461,331. Chas. J. G. Leesemann (to Standard Oil Development Co.).

Separating isoprene from a closely boiling mixture containing C5 monoolefins, C5 paraffins, isoprene and cyclopentadiene by fractional distillation in the presence of an acetone solvent. No. 2,461,346. John A. Patterson (to Standard Oil Development Co.).

Isomerization of a low-boiling saturated hydrocarbon by the action of a liquid conversion catalyst consisting of concentrated liquid hydrofluoric acid and boron trifluoride. No. 2,461,540. Frederick E. Frey (to Phillips Petroleum Co.).

Isomerizing a low-boiling paraffin hydrocarbon having at least 4 carbon atoms by the catalytic action of concentrated liquid hydrofluoric acid with boron fluoride. No. 2,461,541. Frederick E. Frey (to Phillips Petroleum Co.).

Paraffin isomerization by admixing a low-boiling paraffin hydrocarbon having at least 5 carbon atoms per molecule with a low-boiling cycloparaffin having at least 5 carbon atoms in the ring and reacting in the presence of hydrofluoric acid and boron trifluoride. No. 2,461,568. John L. Richmond (to Phillips Petroleum Co.).

Synthesis of liquids from carbon monoxide and hydrogen. No. 2,461,570. Joseph K. Roberts (to Standard Oil Co.).

Isomerization of paraffins in the presence of hydrofluoric acid and boron trifluoride. No. 2,461,598. James D. Gibson (to Phillips Petroleum Co.).

Conversion of a mixture of ethylene and ethane to higher boiling materials by subjecting to an elevated temperature in the presence of a catalyst consisting of silica gel, a metal selected from the group consisting of nickel and cobalt nad alumina. No. 2,461,820. Stanford J. Hetzel and Robert M. Kennedy (to Sun Oil Co.).

Solid bed catalysts regeneration by removing a major portion of carbonaceous material by combustion in an active regeneration step in the presence of an inert gas. No. 2,461,838. Frederick C. Neuhart (to Phillips Petroleum Co.).

High octane motor fuel containing primary aromatic amines and as an inhibitor against color deterioration, a trialkyl amine selected from the group consisting of triamyl amine, trihexyl amine and triheptyl amines. No. 2,461,917. John W. Orelup.

Process and apparatus for the treatment of hydrocarbon oil with solid catalysts. No. 2,461,932. Arthur D. Smith (to Adsorptive Process Co.).

Treating hydrocarbon fluids. No. 2,461,958. Leonard S. Bonnell (to Standard Oil Development Co.).

Improved bonding bituminous material which comprises an asphalt containing lauryl amine and oleic acid. No. 2,461,971. Herbert G. M. Fischer (to Standard Catalytic Co.)

Motor fuel consisting of an alkylate gasoline base stock and a lead alkyl antiknock agent and containing normal butyl para aminophenol and hydroquinone. No. 2,461,972. Herbert G. M. Fischer (to Standard Oil Development Co.).

Hydrocarbon separation by azeotropic distillation. No. 2,461,993. Art. C. McKinnis (to Union Oil Co. of Calif.).

Azeotropic distillation of wide-boiling-range hydrocarbon fractions. No. 2,462,025. Geo. R. Lake and Josephine M. Stribley (to Union Oil Co. of Calif.).

Manufacture of carbon black from natural gas. No. 2,462,026. William Loving (to Godfrey L. Cabot, Inc.).

Cracked gasoline motor fuel containing an inhibitor having the formula, $HOC_6H_4—NR—CH_2—C_6H_4—NR'R''$, where R, R' and R'' are selected from the group consisting of H and alkyl radicals. No. 2,462,237. Ralph B. Thompson and Jos. A. Chenicek (to Universal Oil Products Co.).

Recovery of products of hydrocarbon conversion reactions. No. 2,462,384. Manuel H. Gorin and Will Swerdloff (to Socony-Vacuum Oil Co., Inc.).

Alkylation of polycyclic aromatic hydrocarbons with an olefin and a substantially anhydrous toluene sulfonic acid. No. 2,462,792. Francis T. Wadsworth and Robert J. Lee (to Pan American Refining Corp.).

Alkylation and recovery of aromatic sulfonic acid catalyst. No. 2,462,793. Robt. J. Lee (to Pan American Refining Corp.).

Producing oil soluble petroleum sulfonates by adding concentrated sulfuric acid to the oil in the presence of the added petroleum sulfonate. No. 2,462,829. Paul M. Ruedrich (to Griffin Chemical Co.).

Regeneration of a hydrocarbon synthesis catalyst. No. 2,462,861. Robt. C. Gunness (to Standard Oil Co.).

Contact conversion of hydrocarbons. No. 2,462,891. Henry D. Noll (to Houdry Process Corp.).

Purifying a hydrocarbon liquid containing a relatively small amount of an organic halogen compound and dissolved hydrogen halide. No. 2,463,076. Gordon B. Zimmerman and Clarence G. Gerhold (to Universal Oil Products Co.).

Two-stage process for treating a mixture of a hydrocarbon, dissolved hydrogen fluoride and an organically combined fluorine compound. No. 2,463,077. Gordon B. Zimmerman and Clarence G. Gerhold (to Universal Oil Products Co.).

In the catalytic alkylation of hydrocarbons in the presence of hydrogen fluoride, wherein there is formed a hydrocarbon fraction containing a relatively small amount of an organic fluorine compound, the method which comprises contacting the hydrocarbon fraction with metallic aluminum to liberate hydrogen fluoride. No. 2,463,078. Glenn M. Webb (to Universal Oil Products Co.).

Dehydration of hydrogen chloride-hydrocarbon mixtures by distillation. No. 2,463,187. John W. Latchum, Jr. (to Phillips Petroleum Co.).

Regeneration of fluidized solid catalyst. No. 2,463,434. Rodney V. Shankland (to Standard Oil Co.).

Preparing an aromatic hydrocarbon concentrate by contacting a petroleum stock with acetonitrile-hydrocarbon solvent. No. 2,463,479. Wm. I. Denton and Richard B. Bishop (to Socony-Vacuum Oil Co.).

Separation of olefins from mixtures with saturated hydrocarbons by contacting with a concentrated aqueous solution of silver nitrate and stripping with gaseous carbon dioxide. No. 2,463,482. Alfred W. Francis (to Socony-Vacuum Oil Co.).

Catalytic conversion of hydrocarbons by contacting hydrocarbons under cracking conditions with a contact mass prepared from a composite of moist undried hydrous oxides of silicon, aluminum and manganese. No. 2,463,508. John R. Bates (to Houdry Process Corp.).

Separation of highly branched paraffins into odorless fractions. No. 2,463,601. Chester C. Crawford and Lloyd C. Morris (to Phillips Petroleum Co.).

Treatment of hydrocarbons with metallic halide-hydrocarbon complex catalysts for isomerization of normal butane. No. 2,463,610. Wm. F. Glassmire, Wm. R. Smith and Nelson B. Haskell and Kenneth A. Danskin (to Texas Co.).

Pyrolytic conversion of hydrocarbons. No. 2,463,729. Kenneth Merle Watson (to Sinclair Refining Co.).

Desulfurization and reforming process. No. 2,463,741. Alva C. Byrns (to Union Oil Co. of Calif.).

Alkylation of an isoparaffin with a low-boiling olefin with an aluminum halide-hydrocarbon complex catalyst. No. 2,463,768. Harold J. Hepp (to Phillips Petroleum Co.).

Separating wax from oil. No. 2,463,845. Peter Stanley Backlund and Byron M. Beildeck (to Union Oil Co. of Calif.).

Purifying an aqueous cuprous ammonium acetate solvent used for extraction of butadiene by mixing the contaminated aqueous solvent with a higher alcohol having at least 5 carbon atoms and with liquid butene. No. 2,463,846. Frederick A. Bain and Hibbard Randall Emmerson (to Standard Oil Development Co.).

Producing an improved lubricating oil by contacting an alpha olefin with Friedel-Crafts type catalyst in the presence of an isoparaffin diluent. No. 2,463,872. Raymond L. Heinrich (to Standard Oil Development Co.).

Preparation of hydrocarbon constituents containing more than one carbon atom by contacting feed gases comprising oxides of carbon and hydrogen with a catalyst selected from the class consisting of iron, cobalt, and nickel. No. 2,463,875. Henry J. Hibshman (to Standard Oil Development Co.).

Separation and recovery of butadiene from an alkaline aqueous cuprous salt solution, the improvement which comprises preheating said solution containing the absorbed butadiene then suddenly reducing the pressure, preventing foaming. No. 2,463,902. Michael A. Payne (to Standard Oil Development Co.).

In the manufacture of gasoline from higher boiling petroleum oils, the improvement which comprises mixing a small proportion of a finely divided argillaceous material. No. 2,463,903. Harry L. Pelzer (to Sinclair Refining Co.).

Converting carbon monoxide with hydrogen into valuable synthetic products in the presence of a finely divided synthesis. No. 2,463,912. Walter G. Scharmann (to Standard Oil Development Co.).

Removal of siliceous materials from hydrocarbon mixtures. No. 2,463,930. John Wendell ,Ralph Wildman, Ja. (to Phillips Petroleum Co.).

Canadian

Treating mineral oils and separating various constituents therein by mixing with nitrocyclohexane. No. 455,182. Lawton Arthur Burrows (to E. I. du Pont de Nemours and Co.).

Cyclic process for the production of dienes with substantial yields of resin-forming aromatic hydrocarbons and non-resin forming aromatic hydrocarbons. No. 455,227. Newcomb K. Chaney and Edwin L. Hall (to United Gas Improvement Co.).

*Photographic

Light-sensitive photographic emulsion which comprises a silver halide dispersed in gelatin and a thermal-reversible gel comprised of the interpolymer of an acrylic acid with an acrylic acid amide. No. 2,461,023. Carl E. Barnes and Wm. O. Ney, Jr. (to General Aniline & Film Corp.).

Photographic emulsions sensitized with N,N-alkylenecyanine dyes. No. 2,461,137. Leslie G. S. Brooker (to Eastman Kodak Co.).

Gelatine subbing compositions containing a mixture of formamide and glycerol-α-chlorohydrin. No. 2,461,472. Frank J. Kaszuba (to General Aniline & Film Corp.).

Anti-static gelatin composition suitable for the subbing of a photographic film suport which comprises a gelatin subbing composition containing gelatin, water, a solvent. No. 2,461,473. Frank J. Kaszuba (to General Aniline & Film Corp.).

Anti-static gelatin composition suitable for the subbing of a photographic film support which comprises a gelatin subbing composition containing gelatin, water, a solvent and a diphenylsulfone. No. 2,461,474. Frank J. Kaszuba (to General Aniline & Film Corp.).

Gelatin composition suitable for subbing a photographic film support which comprises gelatin dispersed in a solvent by means of ascorbic acid. No. 2,461,475. Frank J. Kaszuba (to General Aniline Film Corp.).

Gelatin composition suitable for the subbing of a photographic film sup-

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*U. S. Patents from Vol. 619, Nos. 2, 3, 4. Vol. 620, Nos. 1, 2. Canadian from Feb. 8 - Mar. 15.

port, which comprises gelatin dispersed in a solvent by means of lactones or hydroxy lactones. No. 2,461,476. Frank J. Kaszuba (to General Aniline & Film Corp.).

Gelatin subbing compositions containing an unsaturated lactone. No. 2,461,477. Frank J. Kaszuba (to General Aniline & Film Corp.).

Anti-static gelatin composition suitable for the subbing of a photographic film support which comprises a gelatin subbing composition containing a member of the group consisting of ketals and acetals of hexoses and hexitols. No. 2,461,478. Frank J. Kaszuba (to General Aniline & Film Corp.).

Pyrylium dye salts as filter and antihalation dyes in photographic materials. No. 2,461,484. Thos. R. Thompson (to General Aniline & Film Corp.).

Xanthylium dye salts as filter and antihalation dyes in photographic materials. No. 2,461,485. Thos. R. Thompson (to General Aniline & Film Corp.).

Gelatino-silver halide emulsion containing as an anti-plumming agent a compound: $R—S—C(NH_2)=NH_2X$ wherein R represents an alkyl group and X represents a halogen. No. 2,461,987. Edward B. Knott and John Morgan (to Eastman Kodak Co.).

Photographic element comprising a water-insensitive support and a water-permeable colloid layer anchored thereto with a thin layer of a hydrophilic acetal of a vinyl alcohol polymer with an aldehyde containing a group taken from the class consisting of free carboxylic acid and free sulfonic acid groups and their water-soluble salts. No. 2,462,-151. David W. Woodward (to E. I. du Pont de Nemours & Co.).

Photographic element comprising water-permeable colloid layer containing light-sensitive silver halides and a polymeric color former. No. 2,463,838. Cyril D. Wilson (to E. I. du Pont de Nemours & Co.).

Canadian

4,4'-bis (pyrazolone-1-carbamide and thiocarbamide) coupler for colour photography. No. 455,186. Abraham Bavley (to General Aniline & Film Corp.).

Photographic element in which the anti-static layer comprises ethyl tetradecyl hydrogen phosphate. No. 455,187. Fritz W. H. Mueller (to General Aniline & Film Corp.).

Photographic bleaching bath comprising an aqueous solution of an inorganic oxidizing agent and 1-(p-methylphenoxy)-propanol-2. No. 455,188. Frank J. Kaszuba (to General Aniline & Film Corp.).

*Polymers

Making an organopolysiloxane resin by reacting an organosiloxane polymer having 1-2 hydrocarbon radicals per atom of silicon with an aluminum alkoxide. No. 2,460,799. Arthur J. Barry (to Dow Chemical Co.).

Polymerization of organo-polysiloxanes with acid-activated bleaching earth. No. 2,460,805. Edgar C. Britton, Halbert C. White and Clarence L. Moyle (to Dow Chemical Co.).

Acrylonitrile-vinylidene-chlorofluoride copolymers. No. 2,460,844. Frank G. Pearson (to American Viscose Corp.).

Preparing hydrocarbon polymers comprising polymerizing a conjugated aliphatic diolefin by employing anhydrous hydrogen fluoride as the catalyst in the presence of a halogenated aliphatic hydrocarbon solvent. No. 2,460,973. John D. Calfee and John H. Pearson (to Allied Chemical & Dye Corp.).

Making plastic polystyrene. No. 2,460,976. John W. Church (to Falk & Co.).

Polyvinyl alcohol plasticized with an amine adduct of butadiene cyclic sulfone. No. 2,460,995. Carl Walter Mortenson (to E. I. du Pont de Nemours & Co.).

Treatment of hydrocarbon resins. No. 2,461,004. Frank J. Soday (to United Gas Improvement Co.).

Stable protein-formaldehyde dispersion comprising a mixture of formaldehyde and the reaction product of an alkylene oxide and milk casein. No. 2,461,070. Leonard L. McKinney (to U. S. A by Sec. of Agriculture).

Polymerizable chemical, $C_6H_5—CO—C_6H_4—COOR$, where R is selected from the class consisting of allyl and methallyl radicals. No. 2,461,-301. Pliny O. Tawney (to U. S. Rubber Co.).

Diolefin polymerization in the presence of ammonium soap emulsifier. No. 2,461,358. Byron M. Vanderbilt and Frances Bascom (to Standard Oil Development Co.).

Copolymers of alpha-acetamino-acrylates. No. 2,461,383. Elias Isaacs and Herbert Gudgeon (to Imperial Chemical Industries, Ltd.).

Resinous polyamide having a unit length of at least 8. No. 2,461,495. Don E. Floyd (to General Mills, Inc.).

Friction element comprising discrete particles of insoluble furfuraldehyde ketone resin. No. 2,461,508. Mortimer T. Harvey (to Harvel Research Corp.).

Producing a thermosetting resin by reacting under alkaline conditions furfuraldehyde and a ketone having at least 2 hydrogen atoms on an alpha carbon. No. 2,461,510. Mortimer T. Harvey (to Harvel Research Corp.).

Vinyl halide resin capable of resisting discoloration upon heating which comprises a polymer of vinyl halide and mono-olefinic compound, said polymer containing an antimony alkali metal tartrate. No. 2,461,531. Fred W. Cox and James M. Wallace, Jr. (to Wingfoot Corp.).

Preparing oil-acid modified alkyd material by heating glycerine and fatty acids selected from the class consisting of drying oil and semi-drying oil fatty acids dispersed in glyceride oil selected from the class consisting of drying oils and semi-drying oils and maleic anhydride. No. 2,461,564. Chas. G. Moore (to Glidden Co.).

Improving preformed acetone-soluble interpolymers of a styrene, an allylic fumarate, and an allylic alcohol which normally exhibit lachrymatory effects after storage by heating with an inert liquid solvent so that the allylic alcohol is effectively liberated. No. 2,461,735. Chas. A. Heiberger (to U. S. Rubber Co.).

Polymerization of furfuryl alcohol under heat with sulphur as the catalytic agent. No. 2,461,882. Edward R. Dillehay and Robert D. Schuetz (to Richardson Co.).

Polyamine resinous composition and an ink made therefrom. No. 2,461,-918. Frederick Edward Petke (to Sterling Drug, Inc.).

Mixed ester capable of drying on baking in contact with oxygen and iron linoleate, consisting of the reaction product of glycerol with 7-mercaptoheptanoic acid and phthalic anhydride. No. 2,461,920. Burt Carlton Pratt (to E. I. du Pont de Nemours & Co.).

Vinyl chloride-alkyl ester of unsaturated dicarboxylic acid copolymer sponge composition. No. 2,461,942. Walter T. L. Ten Broeck, Jr. (to Wingfoot Corp.).

Oxidizing a polyisobutylene by treating with a mixture of nitric acid and sulphuric acid. No. 2,461,966. Garland H. B. Davis (to Standard Oil Development Co.).

Polymerization of beta-cyanoethyl-propiolate. No. 2,461,990. Joy G. Lichty (to Wingfoot Corp.).

Conjointly polymerized unsaturated substances. No. 2,462,042. Arthur M. Howald and John Leslie Jones (to Libbey-Owens-Ford Glass Co.).

Resinous esters of higher fatty acids with pentaerythritols. No. 2,462,-046. Jos. A. Wyler (to Trojan Powder Co.).

Pentaerythritol condensation products. No. 2,462,047. Jos. A. Wyler (to Trojan Powder Co.).

Epoxy tetramethylol methane and polymerization products thereof. No. 2,462,048. Jos. A. Wyler (to Trojan Powder Co.).

Pentaerythritol condensation with a salt selected from the group consisting of stannous chloride, cadmium chloride, aluminum sulfate, aluminum chloride and lead chloride. No. 2,462,049. Jos. A. Wyler (to Trojan Powder Co.).

Plastic composition comprising a polyamide of a polyfunctional amine and a polyfunctional acid derivable from the polymerization of higher fatty acids and their esters, and a polymerized rosin. No. 2,462,053. Andrew C. Buechele (to General Mills, Inc.).

Furfuryl alcohol-resorcinol resin. No. 2,462,054. John Delmonte (72% to Ralph Hemphill).

Cellulose derivative combined with n-alkoxymethyl polyamide. No. 2,462,159. Robt. L. Brown (to E. I. du Pont de Nemours & Co.).

Composition composed of the reaction product of castor oil with both an acyl halide having from 6-20 carbon atoms and an alpha, beta-olefinic dicarboxylic acid. No. 2,462,209. Herbert F. Minter (to Westinghouse Electric Corp.).

Heating and condensing to a dissolved water-soluble resin-forming condensation product phenol and formaldehyde in water in the presence of an alkali-metal-hydroxide catalyst and polyvinyl alcohol. No. 2,462,-252. Raymond G. Booty (to Weyerhaeuser Timber Co.).

Heating and condensing to a dissolved water-soluble resin-forming condensation product phenol and formaldehyde in water in the presence of alkali-metal-hydroxide catalyst and in the presence of methyl cellulose of the type soluble in alkaline aqueous solution. No. 2,462,-253. Raymond G. Booty (to Weyerhaeuser Timber Co.).

Copolymeric organosiloxane comprising units which contain substantially entirely oxygen atoms, organo-silicon units which correspond to the general formulae $(CH_3)Si\equiv$, (C_6H_5) $(C_2H_5)Si=$, and $(C_2H_5)=(CH_3)_2Si—$. No. 2,462,267. James Franklin Hyde (to Corning Glass Works).

Polymer of ethylene characterized by a crystalline structure of narrow softening temperature range and adhesion to rolls having incorporated therein a modifying agent selected from the group consisting of polyhydric alcohol esters and metal salts of mono-carboxylic fatty acids having from 12-24 carbon atoms. No. 2,462,331. Clayton S. Myers (to Bakelite Corp.).

Heat stable compositions comprising polymeric vinylidene chloride and phenothioxine. No. 2,462,352. Raymond F. Boyer, Lorne A. Matheson and Robt. C. Reinhardt (to Dow Chemical Co.).

Preparing resinous material by polymerization of an aqueous dispersion containing a monethylenically-unsaturated, polymerizable, organic compound having a terminal ethylenic double bond, said aqueous medium containing an oxygen-yielding polymerization catalyst and an inorganic oxidizable sulfoxy compound from the group consisting of sulfur dioxide, sodium bisulfite, sodium sulfite, ammonium bisulfite, sodium hydrosulfite, and sodium thiosulfate. No. 2,462,354. Merlin M. Brubaker and Ralph A. Jacobson (to E. I. du Pont de Nemours & Co.).

Polymerizing ethylene in aqueous medium and obtaining it in the form of a stable dispersion by comprising polymerizing in intimate contact with a buffered aqueous solution of an alkali persulfate. No. 2,462,390. Jesse Harmon (to E. I. du Pont de Nemours & Co.).

Copolymers of dihydrodicyclopentadienyl methacrylate with esters of methacrylic acid. No. 2,462,400. Fred W. Hoover (to E. I. du Pont de Nemours & Co.).

A polymeric vinylidene chloride subject to darkening when exposed for prolonged periods to light and a tetrabromoethane selected from the group consisting of symmetrical and unsymmetrical tetrabromoethane. No. 2,462,412. Lorne A. Matheson and Raymond F. Boyer (to Dow Chemical Co.).

Polymerizing a vinyl halide in an aqueous dispersion by dispersing in an aqueous medium containing a dissolved salt of perdisulfuric acid and sodium bisulfite. No. 2,462,422. Louis Plambeck, Jr. (to E. I. du Pont de Nemours & Co.).

Sulfur-containing polyamides by reacting a polymer selected from the group consisting of N-methylol polycarbonamides and N-alkoxymethyl polycarbonamides with a thiol in the presence of an acid catalyst. No. 2,462,430. Allan K. Schneider (to E. I. du Pont de Nemours & Co.).

Copolymers of styrene and 4,4'-divinyl-biphenyl. No. 2,462,555. Fritz Rosenthal (to Radio Corp. of America).

Separating polymers of varying molecular weight into fractions by forming a solution of said polymers and a saturated hydrocarbon solvent, percolating the solution through a bed of silica gel to selectively adsorb a portion of the polymers. No. 2,462,564. John R. Skeen (to Sun Oil Co.).

Pitch resin produced by demulsification and extraction with liquid phase aliphatic hydrocarbon material and by distillation from a pitch-containing tar emulsion obtained in the vapor phase pyrolysis of petroleum oil in the presence of steam. No. 2,462,593. Howard R. Batchelder (to United Gas Improvement Co.).

Coumarone-indene resin stabilized with an alkyl polyhydroxy spiro indane. No. 2,462,608. Samuel G. Burroughs (to Pennsylvania Industrial Chemical Corp.).

Indene resin stabilized with an alkyl polyhydroxy spiro indane. No. 2,462,609. Samuel G. Burroughs (to Pennsylvania Industrial Chemical Corp.).

Cyclic polymeric compositions corresponding to the general formula $[(CH_3)_2SiNH]_n$ where n is a whole number not more than 4 nor less than 3. No. 2,462,635. Chas. P. Haber (to General Electric Co.).

Resinous organic condensation reaction product produced by heating in the presence of a condensing agent a material selected from the group consisting of formaldehyde, para-formaldehyde, glyoxal, hexamethylene tetramine, trioxymethylene and furfuraldehyde with an organic condensation reaction product produced by subjecting a mixture of a phenol free of unsaturated hydrocarbon substituents and of the class consisting of hydroxybenzene, naphthol, anthranol and their homologues with an alkyl ether of a phenol having an unsaturated hydrocarbon substituent in the presence of a katenoid condensing agent. No. 2,462.636. Mortimer T. Harvey (to Harvel Corp.).

Making methyl siloxanes by hydrolyzing a mixture consisting of methyltriethoxysilane and trimethylethoxysilane, dehydrating the hydrolysis product and recovering the copolymeric methylsiloxane. No. 2,462,-640. James Franklin Hyde (to Corning Glass Works).

Amide-aldehyde resin and as a plasticizer a polyester of a dihydric ether of propylene glycol and a dicarboxylic acid. No. 2,462,658. Eugene W. Moffett (to Pittsburgh Plate Glass Co.).

Condensation products of pentaerythrityltetramine with beta-diketones and beta-hydroxy methylene ketones. No. 2,462,668. Chas. J. Pedersen and Frederick Baxter Downing (to E. I. du Pont de Nemours & Co.).

** U. S. Patents from Vol. 619, Nos. 2, 3, 4. Vol. 620, Nos. 1, 2. Canadian from Feb. 8 - Mar. 15.*

An oxime catalyst for polymerizing olefins. No. 2,462,678. Milton J. Roedel (to E. I. du Pont de Nemours & Co.).

Preparation of carbon dioxide-modified polymers of ethylene by heating ethylene and carbon dioxide in the presence of a free radical-producing catalyst. No. 2,462,680. Donald E. Sargent (to E. I. du Pont de Nemours & Co.).

Stabilized indene and alkyl indene resins containing an antioxidant stabilizing agent comprising a product resulting from the reaction of acetone with an aryl amine selected from the group consisting of aniline, p-amino diphenyl and diphenyl p-phenylene diamine. No. 2,462,684. Frank J. Soday (to United Gas Improvement Co.).

Copolymers of multiolefins with vinyl ethers by a Friedel-Crafts catalyst. No. 2,462,703. David W. Young and Wm. J. Sparks (to Standard Oil Development Co.).

Polymeric condensation product of 1,3-dioxolane and an aromatic compound of the group consisting of benzene and alkyl benzenes. No. 2,462,737. Wm. F. Gresham (to E. I. du Pont de Nemours & Co.).

Copolymer of tetra-allyl pentaerythritol and methyl methacrylate. No. 2,462,817. Lee T. Smith (to U. S. A. by Sec. of Agriculture).

Polymeric methyl methacrylate modified with an aliphatic mercaptan selected from 1-18 carbon atoms. No. 2,462,895. Jos. L. Quinn (to E. I. du Pont de Nemours & Co.).

Urea- or melamine-formaldehyde resin plasticized with polyacrylonitrile. No. 2,463,032. Norman D. Hanson (to Bakelite Corp.).

Thermosetting molding composition which consists of a reaction product of an aqueous rosin emulsion with a basic alkaline earth metal compound and a filler. No. 2,463,044. Earle R. McLean (to Clark Thread Co.).

Making a resin from p-phenyl phenol, a diluent, a water solution of formaldehyde, an acid catalyst, and a suriace active wetting agent. No. 2,463,501. James A. Arvin (to Sherwin-Williams Co.).

Vulcanizable interpolymer by polymerizing vinylidene chloride, butadiene-1,3 and isobutylene. No. 2,463,571. George William Stanton and Charles Everett Lowry (to Dow Chemical Co.).

Ternary, vulcanizable interpolymer by polymerizing vinylidene chloride, butadiene and vinyl acetate. No. 2,463,572. George William Stanton and Charles Everett Lowry (to Dow Chemical Co.).

Vulcanizable interpolymer by polymerizing butadiene, vinylidene chloride and vinyl chloride. No. 2,463,573. George William Stanton and Charles Everett Lowry (to Dow Chemical Co.).

Vulcanizable interpolymer by polymerizing vinylidene chloride, butadiene-1,3 and alpha-methyl styrene. No. 2,463,574. George William Stanton and Charles Everett Lowry (to Dow Chemical Co.).

Vulcanizable ternary interpolymer by polymerizing vinylidene chloride, butadiene-1,3 and ethyl acrylate. No. 2,463,575. George William Stanton and Charles Everett Lowry (to Dow Chemical Co.).

Polymerized nuclear trichlorostyrene. No. 2,463,897. John C. Michalek (to Mathieson Chemical Corp.).

Composition of matter which comprise a resinous polymeric organo-silicon oxide condensation product and ethyl cellulose. No. 2,463,974. Oscar Kenneth Johannson (to Corning Glass Works).

Making polymers by heating a monoaminomonohydric alcohol, an aliphatic dicarboxylic acid and an aliphatic monohydroxymonocarboxylic acid. No. 2,463,977. Edward L. Kropa (to American Cyanamid Co.).

Preparing a polymer of a chloroformate of an unsaturated monohydric alcohol containing 3-9 carbon atoms, having aliphatic unsaturation between the second and third carbon atoms from the hydroxyl group in the presence of an organic percarbonate ester. No. 2,464,056. Alphonse Pechukas (to Pittsburgh Plate Glass Co.).

Preparing a polymer of a monomeric, unsaturated ester, having an olefinic bond attached to the second carbon atom from an ester linkage by polymerizing in the presence of an alkyl peroxydicarbonate. No. 2,464,062. Franklin Strain (to Pittsburgh Plate Glass Co.).

Polymers of alpha-fluoroacetoxyacrylonitrile compounds. No. 2,464,120. Jos. B. Dickey and Theodore E. Stanin (to Eastman Kodak Co.).

Vinyl chloride resins stabilized with alkali metal or alkaline earth metal salts of nitro suostituted alkanes. No. 2,464,177. John K. Fincke (to Monsanto Chemical Co.).

Canadian

Moulding powder which comprises a powdered thermosetting polymeric organo-silicon oxide having less than two organic radicals per silicon atom, the organic substituents of said oxide consisting essentially of phenyl radicals, and a minor proportion of boric oxide. No. 454,479. Rob Roy McGregor and Earl Leathen Warrick (to Corning Glass Works).

Clear, colourless resin which is a copolymer of a polyester of an allyl alcohol with a polybasic acid and a polyester of a saturated monohydric alcohol and an alpha, beta unsaturated polycarboxylic acid. No. 454,598. Edward L. Kropa (to American Cyanamid Co.).

Emulsion polymerization of reactive vinyl hydrocarbon and an unsaturated alkyd resin containing a plurality of polymerizably reactive alpha, beta-enal groups. No. 454,599. Edward L. Kropa (to American Cyanamid Co.).

Resinous copolymer of isopropenyl acetate and an ester selected from the group consisting of an ester of a monohydric alcohol and maleic acid and an ester of a monohydric alcohol and fumaric acid. No. 454,810. William O. Kenyon and Cornelius C. Unruh (to Canadian Kodak Co., Ltd.).

Plastic composition containing a water-insoluble, originally alcohol-soluble resinous partial acetal of polyvinyl alcohol and an aliphatic monoaldehyde and an aliphatic dicarbonylic compound of the group consisting of glyoxal and methyl glyoxal. No. 454,832. Howard D. Cogan and Richard W. Quarles (to Carbide and Carbon Chemicals, Ltd.).

Ester gum comprising the reaction product of abietic acid and polyallyl alcohol. No. 455,148. Harry F. Plann and Edward L. Kropa (to American Cyanamid Co.).

Composite article comprising polyvinyl chloride adhered to vulcanized natural rubber. No. 455,190. George Henry Taft (to B. F. Goodrich Co.).

Vulcanizable composition comprising resinforming material consisting of furfuryl alcohol and reactive polymerized furfuryl alcohol, and sulphur. No. 455,201. John J. Clancy (to Arthur D. Little, Inc.).

Polymerized composition comprising copolymer of vinylidene chloride and methyl methacrylate; and methyl methacrylate. No. 455,221. Willem Leendert Johannes de Nie (to Shell Development Co.).

*Processes and Methods

Treating azeotropic mixtures of water with a compound taken from a group consisting of methylethylketone, propyl alcohol, isopropyl alcohol and acetonitrile by treating with ammonium carbonate. No. 2,461,048. Jean Leon Maurice Fréjaques (to Compagnie de Produits Chimiques et Electrometallurgiques Alais).

Contacting gaseous fluids and solid particles. No. 2,461,343. Henry J. Ogorzaly and Alexis Voorhies, Jr. (to Standard Oil Development Co.).

In the photocatalytic reaction of a gaseous reactant with another material, the improvement which comprises catalyzing the activity of said gaseous reactant by illuminating it with the light from the gaseous reactant excited to produce a discharge glow. No. 2,463,669. Joseph Henry Percy (to Colgate-Palmolive-Peet Co.).

Separation of close-boiling naphthenes by azeotropic distillation by azeotropically distilling in the presence of a sufficient amount of an ester. No. 2,463,919. Josephine M. Stribley and Geo. R. Lake (to Union Oil Co. of Cal.).

*Rubber

Rubbers modified by abietic nitriles. No. 2,461,349. Anderson W. Ralston and Hoyt M. Corley (to Armour & Co.).

Composition comprising a rubbery copolymer of butadiene and styrene and a resin occurring in Utah resin-bearing coal. No. 2,461,551. Ernest D. Lee and Loy S. Engle (to Interchemical Corp.).

Adhesive composition containing an isobutene-diolefin rubbery copolymer and a resin occurring in Utah resin-bearing coal. No. 2,461,552. Lino J. Radi (to Interchemical Corp.).

Adhesive composition containing polychloroprene rubber and a resin occurring in Utah resin-bearing coal. No. 2,461,553. Lino J. Radi (to Interchemical Co.).

Rubbery polymeric material prepared by reacting piperylene with a compound of the group consisting of monochloromaleic anhydride and dichloromaleic anhydride dissolved in an aromatic hydrocarbon solvent. No. 2,461,679. Albert M. Clifford and Clyde E. Gleim (to Wingfoot Corp.).

Compounding copolymers of butadiene and styrene with sulfur. No. 2,461,953. Ernest G. Bargmeyer (to U. S. Rubber Co.).

Rubber hydrochloride film plasticized with dibutyl sebacate and methyoxyethyl oleate. No. 2,461,963. La Verne E. Cheyney (to Wingfoot Corp.).

Vulcanizing rubbery butadiene polymers with dixanthic disulfides. No. 2,462,572. Monte C. Throdahl (to Monsanto Chemical Co.).

Improving the creaming of synthetic latices obtained by the polymerization of a conjugated compound in aqueous emulsion using an ammonium soap emulsifier which comprises adding formaldehyde to said latex to make the latex unstable and to increase the particle size of the latex and then adding an alkali to the latex to render it stable. No. 2,462,591. Erving Arundale (to Standard Oil Development Co.).

A vulcanizable rubbery copolymer of butadiene with acrylonitrile and ethyl cellulose together with plasticizers, fillers, sulfur and a vulcanization accelerator. No. 2,462,629. Philip Tucker Gidley (to Standard Oil Development Co.).

Chemical plasticizers or softeners for butyl rubber comprising a cyclic carbon ring peroxide having from 10-14 inclusive carbon atoms per molecule and at least 2 coupled oxygen atoms. No. 2,462,674. John Rehner, Jr. and Paul J. Flory (to Standard Oil Development Co.).

Aryl trichlorothio acetates in elastomer treatment. No. 2,462,742. Alban Thomas Hallowell (to E. I. du Pont de Nemours & Co.).

Activator for thiazole accelerators and thiuram accelerators, the reaction product of tall oil and triethanolamine. No. 2,462,832. Cleon R. Johnson.

Preparing 1,3-butadiene-styrene elastomers by incorporating in the elastomer latex an arylmercaptan selected from the group consisting of the arylmercaptans of the benzene and the naphthalene series. No. 2,463,219. Jos. H. Trepagnier (to E. I. du Pont de Nemours & Co.).

Mixing in a butadiene-styrene elastomer a compound of the group consisting of para-nitroso-dimethylaniline, nitroso-beta-naphthol, phenylhydrazine, and thio-alpha-naphthol, and exposing the mixture to oxygen until the mixture becomes a heavy viscous liquid. No. 2,463,224. John R. Vincent (to E. I. du Pont de Nemours & Co.).

In the preparation of synthetic rubber-like polymers from 1,3-butadienes by carrying out the polymerization in the presence of a polymerization modifier of the formula R—CI$_3$, in which R stands for a substituent of the group consisting of —H, —I, and —CH$_3$. No. 2,463,225. John Richard Vincent (to E. I. du Pont de Nemours & Co.).

Plasticized elastomer compositions. No. 2,463,829. Philip F. Tryon (to Commercial Solvents Corp.).

Olefinic elastomers. No. 2,463,866. Arthur Donald Green (to Standard Oil Development Co.).

Canadian

Rubber substitute which is the heat-conversion product of a partially hydrolyzed polyvinyl ester, an inorganic oxidizing agent and an aromatic halogen-containing oxidizing agent selected from the class consisting of picryl chloride, pentachlorophenol, chloroacetanilide, and tetrachlorquinone. No. 454,485. Charles Fleming Brown (to Dominion Rubber Co., Ltd.).

*Specialties

Prevention of foaming in steam generation by dispersing a surface-active predominantly hydrophophobic organic compound, each of the molecules of which includes interconnected hydrophilic radicals selected from the group consisting of ester and amide radicals, the hydrophilic radicals in said molecules each being spaced from one another by not more than 5 carbon atoms each of said selected radicals having attached thereto an unsubstituted hydrocarbon chain containing at least 12 carbon atoms. No. 23,085. Lewis O. Guneson (to Dearborn Chemical Co.).

White writing ink consisting of a solution in a volatile organic solvent of a cellulose ester and a soluble organic crystalline compound. No. 2,460,925. Wm. E. Decker (to Technical Specialties Co.).

Stabilizing animal fats against rancidity by adding the comminuted fibrous portion of a citrus fruit. No. 2,461,080. Michael M. Piskur and James W. Higgins (to Swift & Co.).

Soldering flux consisting of rosin and benzilic acid. No. 2,461,154. Thos. Alton Hale (to Eastman Kodak Co.).

Soldering flux consisting of rosin and a compound selected from the group consisting of alpha naphthoic acid, beta naphthoic acid, alpha naphthoic acid anhydride and beta naphthoic acid anhydride. No. 2,461,155. Thos. Alton Hale (to Eastman Kodak Co.).

Flameproofing a material by dipping the material in a solution of antimony chloride and an organic phosphite. No. 2,461,302. John Truhlar and Athan A. Pantsios (to Rudolf F. Hlavaty).

Reducing the corrosiveness of a corrosive fluid including moisture, petroleum hydrocarbons and a corrosion-producing amount of carbon dioxide by introducing a corrosion inhibiting amount of hydrogen sulfide. No. 2,461,359. Prentiss S. Viles and Elza Q. Camp (to Standard Oil Development Co.).

In a fire-retarding composition the combination of a flameproofing agent selected from the group consisting of chlorinated paraffin, chlorinated

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** U. S. Patents from Vol. 619, Nos. 2, 3, 4. Vol. 620, Nos. 1, 2. Canadian from Feb. 8 - Mar. 15.*

naphthalene, and chlorinated diphenyl and a powdered water- and organic solvent-insoluble non-combustible glow-retarding reaction product of an aldehyde with a member of the group consisting of urea, thiourea, bluret, guanidine, dicyandiamide and melamine. No. 2,461,538. Earl K. Fischer (to Interchemical Corp.).

Pressure sensitive greaseproof adhesive type laminant containing polymerized linseed oil, chlorinated rubber, micro crystalline wax, ethyl acetate and toluene. No. 2,461,704. Fred B. Speyer (to Shellmar Products Corp.).

Inhibiting foam formation in an aqueous gas-liquid system by incorporating a predominantly hydrophobic surface-active organic substance comprising the condensation product of a higher fatty acid and an aliphatic polyamine, further condensed with a higher fatty acid. No. 2,461,730. Lewis O. Gunderson (to Dearborn Chemical Co.).

Antioxidant for stabilizing fatty materials by contacting a crude fatty material containing natural antioxidants with a solvent selected from the group consisting of methanol and ethanol and contacting the extract with ammonia to increase its antioxidant activity. No. 2,461,807. Loran O. Buxton and Chas. E. Dryden (to Nopco Chemical Co.).

Producing an antioxidant for stabilizing fatty materials by contacting a crude fatty material containing natural antioxidants with a solvent selected from the group consisting of isopropanol, n-propanol, acetone, diacetone alcohol, ethyl acetate, methyl acetate and methyl ethyl ketone containing at least 10% of water. No. 2,461,808. Loran O. Buxton and Chas. E. Dryden (to Nopco Chemical Co.).

Medicinal capsule consisting of hydrolized gluten, mineral oil, gelatine and glycerine and water. No. 2,461,820. Leslie Lowen (to Chemprotin Products, Laszlo Kormendi and B. Clark Boeckeler).

Lubricating composition consisting of mineral lubricating oil and an oil-soluble metal salt of an acidic reaction product obtained by reacting a lubricating oil fraction of petroleum with a compound of phosphorus of the class of phosphorus sulfides and phosphorus oxides. No. 2,461,961. John P. Buckmann and Loren L. Neff (to Union Oil Co. of Calif.).

Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

Lan-O-Sheen. Cleaning powder for rugs, upholstery, and for a cleaning compound having incidental water softening properties. 460,550. Lan-O-Sheen, Inc.

WATAWAX. Polishing and cleaning compound. 473,890. J. E. Johnson & Co.

Model home. Cleaning and polishing fluid. 487,234. Western Auto Supply Co.

SEAL. Moth sprays, fly destroyers, disinfectants, and mosquito destroyer. 487,693. Seal & Co. and Office Supply and Equipment Co.

SUPER-TEX. Chemical compound for waterproofing wood, brick, concrete, and like building materials. 507,156. Tex Prods, Inc.

LONG SERVICE. Paint. 507,750. Continental Paint & Varnish Co.

SOFTONE. Low contrast photographic developer. 508,013. Mallinckrodt Chemical Wks.

INSECT-O-POWDER. Insecticides. 508,098. Andrew Wilson, Inc.

PURE-MOR. General disinfectant. 513,632. Hilltop Labs., Inc.

P. Solvents for the cleaning of metal parts. 513,835. Phillips Mfg. Co.

HUDSON. Ready mixed aluminum paint. 514,342. H. D. Hudson Mfg. Co.

RUS-TROL. Ready-mixed paints. 516,639. Sapolin Co., Inc.

720. Cleaning fluid. 518,044. Atlas Products Co.

KUALATEX. Aqueous dispersion of rubber; compounded or uncompounded. 519,762. Latex Distributors, Inc.

CORTLAND. Welding fluxes and compounds. 519,928. Cortland Welding Compound Co.

Dr. Loebel's. Liquid insecticide. 520,704. Huntington Labs., Inc.

GAY-MOR. Shellac, floor polishes, etc. 521,974. Gay-Mor Shellac Mfg. Co., Inc.

Eastco. Protective coatings and finishes. 522,013. Eastern States Paint and Varnish Co.

COMAVAR. Mixed oil paints, primers, synthetic resinous paints, lacquers, etc. 522,876. Coating Materials Labs., Inc.

WRINCO. Mixed oil paints, primers, synthetic resinous paints, etc. 522,877. Coating Materials Labs., Inc.

COMASYN. Mixed oil paints, primer, synthetic resinous paints, etc. 522,879. Coating Materials Labs., Inc.

COMALAC. Mixed oil paints, primers, synthetic resinous paints, lacquers, rubber based paints. 522,882. Coating Materials Labs., Inc.

LU-MAR. Liquid wax polishes. 523,107. Lu-Mar Products Co.

COMAFLEX. Mixed oil paints, primers, synthetic resinous paints, lacquers, rubber based paints, vinyl coatings used as paints. 523,881. Coating Materials Labs., Inc.

WELD-TITE. Exterior Primer paint. 528,044. Minnesota Linseed Oil Paint Co.

ARTISTA FLEXOL. Paint material comprising an emulsion containing pigments soluble in water. 528,110. Binney & Smith Co.

KEDGE. Resinous plastic solutions for coating, impregnating, sizing, or water proofing paper, textiles, or composition sheet material. 529,800. Monsanto Chemical Co.

Nu-Gloss. Liquid cleaner, restorative and preservative. 532,076. Western Chemical Co.

MARKAY. Soap powder. 532,832. Markay Products Co.

SWP, COVER THE EARTH. Soap and metal polishes. 533,513. Sherwin-Williams Co.

SWP, COVER THE EARTH. For leaded zinc, zinc oxide, lithopone, red lead, white lead silicates, synthetic resins, vegetable oils, and dry colors. 533,514. Sherwin-Williams Co.

PURR-GE. Composition for cleaning crankcases, consisting of a mixture of soap, volatile organic solvents, and lubricating oil. 534,421. E. F. Drew & Co., Inc.

Geronite. Powdered water soluble cleanser. 534,503. Anderson Chemical Co.

(Symbol) Wood floor seal and finish. 534,882. Diversey Corp.

EGSHELCOTE. Paint. 536,429. Patek Bros.

BUCKSKIN. Ready mixed paint. 538,066. Armstrong Paint & Varnish Wks.

PATRICIAN. Paint enamels. 538,076. Armstrong Paint & Varnish Wks.

SKIPPER. Varnish. 538,078. Armstrong Paint & Varnish Wks.

X-L. Paste floor wax. 538,431. Mobile Paint Mfg. Co.

Vel Rez. Resin emulsion paint. 538,432. Mobile Paint Mfg. Co. of Delaware, Inc.

GRE-SOLVENT. Detergent for cleansing the skin, kitchen utensils, and similar articles. 538,472. Utility Co., Inc.

TIGER BRAND. Paints, varnishes, paint enamels, etc. 538,768. W. W. Lawrence & Co.

Lawrence. Paints; varnishes; paint enamels, etc. 538,772. W. W. Lawrence & Co.

NORWOOD. Paints; varnishes; lacquers, etc. 538,781. W. W. Lawrence & Co.

ART GRAIN. Wood stains and paints. 538,791. W. W. Lawrence & Co.

DEVEX W-50. Insecticide. 538,834. Westvaco Chlorine Products Corp.

FERTIDINE. Compound containing iodine, for use with fertilizers. 539,493. Clairmint Chemical Co., Inc.

STETSON. Paint and paint enamel. 539,772. Stetson Paint & Varnish Co.

VOGUE. Varnish, paint and paint enamel. 539,788. Stetson Paint & Varnish Co.

CARBASOL. Resins for varnishes and similar coating compositions. 540,447. C. J. Osborn Co.

Sunseal. Ready-mixed paints and varnishes. 540,665. Goodyear Paint and Varnish, Inc.

PERMA-NEW. Silver polish 540,989. Estabrook Labs.

HEILEX. Protective and corrosion-resistant coatings and linings. 541,541. Heil Process Equipment Corp.

FARM BUREAU. Insecticides and fungicides. 541,660. Farm Bureau Cooperative Association, Inc.

SKYLINE. Synthetic resin coating compositions. 543,509. Monsanto Chemical Co.

POLYFAX. Pigmented ground or primer coatings. 543,607. Interchemical Corp.

RAPID. Soap powder. 543,670. West Coast Soap Co.

Cresco. Sulphur used for agricultural purposes. 543,760. Stauffer Chemical Co.

(Symbol). Ready mixed oil paints, varnishes, etc. 544,131. Vane-Calvert Paint Co.

WALL-TITE. Paints, varnishes, lacquers, paint enamels, paint fillers, and paint undercoaters. 545,298. Sherwin-Williams Co.

Glid-N. Liquid furniture polish. 545,362. Glidden Co.

Glid-N. Scratch removers in liquid form. 545,363. Glidden Co.

DIXON. Silica graphite, paint, red lead graphite primer, chromate graphite primer, red lead paint, aluminum graphite paint, floor enamel, and machinery enamel paint. 545,828. Joseph Dixon Crucible Co.

MEREZ. Metal resinates. 546,696. Glidden Co.

TRIAD. Chlorinated hydrocarbon solvents. 546,974. Detrex Corp.

Ponderosa. Furniture polish. 546,992. Griffin Mfg. Co.

MULTITITE. Printing ink. 547,180. Sun Chemical Corp.

S-UTILITY. Printing ink. 547,182. Sun Chemical Corp.

HI-TEST. Brazing and welding flux. 547,303. Air Reduction Sales Co.

MATCHLESS. Aluminum flux for welding cast aluminum. 547,305. Air Reduction Sales Co.

LOTION CREAM. Preparation for cleaning and polishing shoes. 547,338. Griffin Mfg. Co.

ULMETS. Antacid and demulcent. 547,981. S. F. Durst & Co., Inc.

PINTOFF. Liquid remover for paint, enamel, and varnish. 547,994. International Paint Co., Inc.

JAN-O. Floor waxes, polishes, and oils. 547,995. Janitors Supply House, Inc.

SHELL. Dry cleaning solvents. 548,113. Shell Oil Co., Inc.

MATAWAN. Compositions for cleaning metals. 548,369. Hanson-Van Winkle-Munning Co.

REPRODOL. Chemicals used in photographic developing processes. 548,812. General Aniline & Film Corp.

ANODEX. Dry alkaline cleansing preparations for cleaning metals preparatory to electro-plating. 548,972. Macdermid, Inc.

M-S-F. Compounds for dissolving grease and oil. 548,988. Moto-Sway Corp. of America.

QO. Furan chemicals. 548,994. Quaker Oats Co.

Carbo-Graph. Roofing paints. 549,113. Black Diamond Paint & Varnish Wks., Inc.

EPON. Synthetic resins. 549,179. Shell Chemical Corp.

Warner. Radiator cleaners and rust inhibitors. 549,310. Warner-Patterson Co.

(Symbol). Nitrocellulose, cellulose acetate, cellulose acetate-butyrate, ethyl cellulose, and carboxymethylcellulose. 549,543. Hercules Powder Co.

DRISCOSE. Sodium salt of carboxymethylcellulose as an additive for drilling muds. 550,675. Drilling Specialties Co.

EASTERN STATES. Disinfectants, insecticides, fungicides, and bactericides. 551,252. Eastern States Farmers' Exchange.

MOHITE. Bleaching compound. 551,700. Mohawk Chemical Co.

ELIXIRIN. Printing inks. 553,707. Interchemical Corp.

Gladella. Liquid, paste, and powder detergents. 553,956. Gladella Products.

TENLO. Polyhydroxy alcohol fatty acid ester used as wetting agent and spreader for agricultural chemicals. 554,375. Griffin Chemical Co.

DITTO. Liquid soap, and typewriter type and platen cleaner. 554,866. Ditto, Inc.

(Symbol). Liquid soap, and typewriter type and platen cleaner. 554,867. Ditto, Inc.

WESTOLITE. Cleaning compound. 555,582. West Disinfecting Co.

70. Concentrated sulphur paste for use as an insecticide and fungicide. 555,635. Stauffer Chemical Co.

112 FOR RATS. Rat poison. 555,684. Master Labs.

TAKALAB. Preparation for cleaning fabrics. 555,781. Takamine Lab., Inc.

(Symbol). Dry colors used in the manufacture of printing inks. 555,827. Magruder Color Co., Inc.

UNIPHAT. Fatty acid esters. 556,332. General Mills, Inc.

Kil-Roy Rat. Rat poison. 556,489. Robert R. Slusser.

ONYXIDE. Disinfectant. 556,908. Onyx Oil & Chemical Co.

VICARTRUE. Dishwashing cleanser. 558,188. Virginia-Carolina Chem. Corp.

CUDASOL. Chlorinated solution used in dairies for disinfecting. 558,354. Cudahy Packing Co.

SOLV—ALL. Detergent for use in removing oil. 558,368. Cudahy Packing Co.

BUGMASTER. Insecticide. 558,405. Michigan Chemical Corp.

SAV-A-TANK. Rust inhibitor. 558,687. Sudbury Lab.

Ne-So. Polishes. 559,602. "Ne-So" Chemical Co.

HUM. General household cleaner. 559,747 Theobald Industries.

FIXTAN. Chemical preparations for impregnating wood, textile, and other substances, for preservation against fungi. 560,072. Ward, Blenkinsop & Co., Ltd.

Z-C. Fungicides. 561,664. Food Machinery Corp.

Barrett. Hydrocarbons, alcohols, ketones, phenols, etc. 561,708. Allied Chemical & Dye Corp.

SLICK GLASS COAT. Cleaner for glass surface and silverware. 563,283. Slick-Shine Co.

(Symbol). Mixed paints, varnishes, lacquers, varnish-stains, and paint and baking enamels. 570,463. Interchemical Corp.

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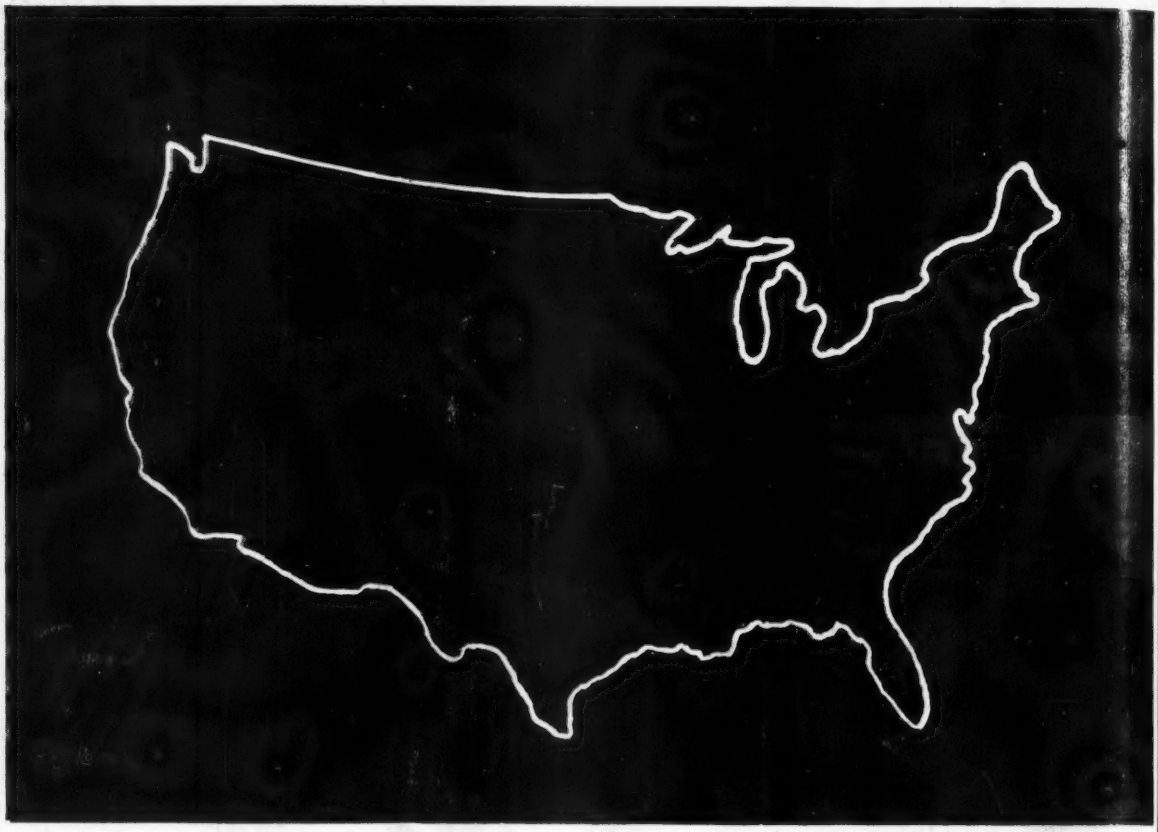

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Chemical Industries

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